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Water Resources Data for Michigan, Water Year 1977

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Water Resources Data for Michigan

Water Year 1977

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MI-77-1

Prepared in cooperation with the State of Michigan and with other agencies

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CALENDAR FOR WATER YEAR 1977

1976

OCTOBER

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Water resources data for the 1977 water year for Michigan consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water temperature of ground water. This report contains discharge records for 195 gaging stations; stage only records for 1 gaging station; stage and contents for 5 lakes and reservoirs; water quality for 77 continuous-record stations, 21 partial-record stations and 7 lakes; and water levels for 45 observation wells. Also included are 88 crest-stage partial-record stations and 31 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Michigan.

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Water Resources Data for Michigan

Water Year 1977

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MI-77-1

Prepared in cooperation with the State of Michigan and with other agencies

UNITED STATES DEPARTMENT OF THE INTERIOR

Cecil D. Andrus, Secretary

GEOLOGICAL SURVEY

H. W. Menard, Director

For information on the water program in Michigan write to
District Chief, Water Resources Division
U.S. Geological Survey
6520 Mercantile Way
Lansing, Michigan 48910

1978

PREFACE

This report was prepared by personnel of the Michigan district of the Water Resources Division of the U.S. Geological Survey under the supervision of T. R. Cummings, District Chief, and J. T. Callahan, Regional Hydrologist, Northeastern Region, succeeded by J. E. Biesecker. It was done in cooperation with other agencies.

This report is one of a series issued by State. General direction for the series is by J. S. Cragwall, Jr., Chief Hydrologist, U.S. Geological Survey, and G. W. Whetstone, Assistant Chief Hydrologist for Scientific Publications and Data Management.

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[Letter after station name designates type of data: (d) discharge, (c) chemical, (b) biological, (g) gage height, (m) microbiological, (t) water temperature, (s) sediment]

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WATER RESOURCES DATA FOR MICHIGAN, 1977

INTRODUCTION

Water resources data for the 1977 water year for Michigan consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water temperature of ground water. This report contains discharge records for 195 gaging stations; stage only records for 1 gaging station; stage and contents for 5 lakes and reservoirs; water quality for 77 continuous-record stations, 21 partial-record stations, and 7 lakes; and water levels for 45 observation wells. Also included are crest-stage partial-record stations and low-flow partial-record stations. Additional water data were collected at various sites, not involved in the systematic data collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System collected by the U.S. Geological Survey and cooperating State and Federal agencies in Michigan.

Records of discharge or stage of streams, and contents or stage of lakes and reservoirs were first published in a series of U.S. Geological Survey water-supply papers entitled, "Surface Water Supply of the United States." Through September 30, 1960, these water-supply papers were in an annual series and then in a 5-year series for 1961-65 and 1966-70. Records of chemical quality, water temperatures, and suspended sediment were published from 1941 to 1970 in an annual series of water-supply papers entitled, "Quality of Surface Waters of the United States." Records of ground-water levels were published from 1935 to 1974 in a series of water-supply papers entitled, "Ground-Water Levels in the United States." Water-supply papers may be consulted in the libraries of the principal cities in the United States or may be purchased from Branch of Distribution, U.S. Geological Survey, 604 South Pickett Street, Alexandria, VA 22304.

For water years 1961 through 1974, streamflow data were released by the Geological Survey in annual reports on a State-boundary basis. Water-quality records for water years 1964 through 1974 were similarly released either in separate reports or in conjunction with streamflow records. Ground-water records beginning with the 1956 calendar year and continuing through calendar year 1975 have been released by the Geological Survey in annual reports on a State-boundary basis. Beginning with the 1975 water year, water data for streamflow, water quality, and ground water are published as an official Survey report on a State-boundary basis. These official Survey reports carry an identification number consisting of the two-letter State abbreviation, the last two digits of the water year, and the volume number. For example, this report is identified as "U.S. Geological Survey Water-Data Report MI-77-1." Water-Data reports are for sale by the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161.

COOPERATION

The U.S. Geological Survey and organizations of the State of Michigan have had cooperative agreements for the systematic collection of streamflow records since 1930, for ground-water levels since 1932, and for water-quality records since 1951. Organizations that assisted in collecting data through cooperative agreement with the Survey are:

State Department of Natural Resources, H.A. Tanner, director, through Water Management Division, D.W. Granger, chief, and Geological Survey Division, A.E. Slaughter, chief.

State Department of State Highways, J.P. Woodford, director.

State Department of Agriculture, B.D. Ball, director, through Soil and Water Conservation Division, D.J. Schaner, chief.

Assistance in the form of funds or services was given by the Corps of Engineers, U.S. Army, in collecting records for 29 gaging stations published in this report. Assistance was also furnished by the National Weather Service, National Oceanic Atmospheric Administration, U.S. Department of Commerce, Soil Conservation Service, U.S. Department of Agriculture, Environmental Protection Agency, and the National Park Service.

The following organizations aided in collecting records:

Kalamazoo County Board of Supervisors; Macomb County Board of Supervisors; Macomb County Road Commission; Oakland County Department of Public Works; Oakland County Drain Commission; Genesee County Drain Commission; Southeast Michigan Council of Governments; Tri-County Planning Commission; Washtenaw County Drain Commission; Washtenaw County Planning Commission; Huron-Clinton Metropolitan Authority; Township of Ypsilanti, Cities or villages of Ann Arbor, Battle Creek, Coldwater, Imlay City, Ironwood, Lansing, Saline, and Ypsilanti; Allied Paper Inc.; Consumers Power Co.; Cleveland-Cliffs Iron Co.; Fisher Body Division of General Motors Corp.; Hanna Mining Co.; Michigan Power Co.; Michigan Sugar Co.; Peter Eckrich and Sons, Inc.; Upper Peninsula Power Co.; and Wisconsin-Michigan Power Co.

Organizations that supplied data are acknowledged in station descriptions.

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Michigan district personnel who contributed significantly to the collection and preparation of the data in this report were: J.B. Miller, chief, data section, assisted by P.W. Anttila, V.D. Herreid, G.C. Hulbert, T. Sieger, G.C. Huffman, and B.A. Kuczera.

HYDROLOGIC CONDITIONS

At the beginning of the water year streamflow was deficient in the Upper Peninsula and in the northern part of the Lower Peninsula. During October and November below normal precipitation and near record low temperatures caused runoff to remain deficient. Severe cold temperatures prevailed throughout December, January, and part of February. From November to February all three index stations (fig. 1) reported deficient runoff. During the year, runoff was deficient at the index station Sturgeon River near Sidnaw for 7 months, for Muskegon River at Evart 10 months, and for Red Cedar River at East Lansing 6 months. Annual runoff during the 1977 water year was below median throughout the State.

In figure 1, the monthly and annual mean discharge is compared with the median discharge for the period 1941-70 at the three index stations.

During the first part of the year, ground-water levels were on the decline and below normal. The western part of the Upper Peninsula was suffering from drought conditions and water levels there were at an all-time low. By years end, water levels in most wells in the State were on the rise.

DEFINITION OF TERMS

Terms related to streamflow, water-quality, and other hydrologic data, as used in this report, are defined below. See also the table for converting English units to International System of units (SI) on the inside of the back cover.

Acre-foot (AC-FT, acre-ft) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.

Adenosine triphosphate (ATP) is the primary energy donor in cellular life process. Its central role in living cells makes it an excellent indicator of the presence of living material in water. A measure of ATP therefore provides a sensitive and rapid estimate of biomass. ATP is reported in micrograms per liter of the original water sample.

Algae are mostly aquatic single-celled, colonial, or multi-celled plants, containing chlorophyll and lacking roots, stems, and leaves.

Algal growth potential (AGP) is the maximum algal dry weight biomass that can be produced in a natural water sample under standardized laboratory conditions. The growth potential is the algal biomass present at stationary phase and is expressed as milligrams dry weight of algae produced per liter of sample.

Aquifer is a geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Artesian means confined and is used to describe a well in which the water level stands above the top of the aquifer, tapped by the well. A flowing artesian well is one in which the water level is above the land surface.

Bacteria are microscopic unicellular organisms, typically spherical, rodlike, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

Total coliform bacteria are a particular group of bacteria that are used as indicators of possible sewage pollution. They are characterized as aerobic or facultative anaerobic, gram-negative, nonspore-forming, rod-shaped bacteria which ferment lactose with gas formation within 48 hours at 35°C. In the laboratory these bacteria are defined as the organisms which produce colonies within 24 hours when incubated at 35°C ± 1.0°C on M-Endo medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal coliform bacteria are bacteria that are present in the intestines or feces of warm-blooded animals. They are often used as indicators of the sanitary quality of the water. In the laboratory they are defined as all organisms which produce blue colonies within 24 hours when incubated at 44.5°C ± 0.2°C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

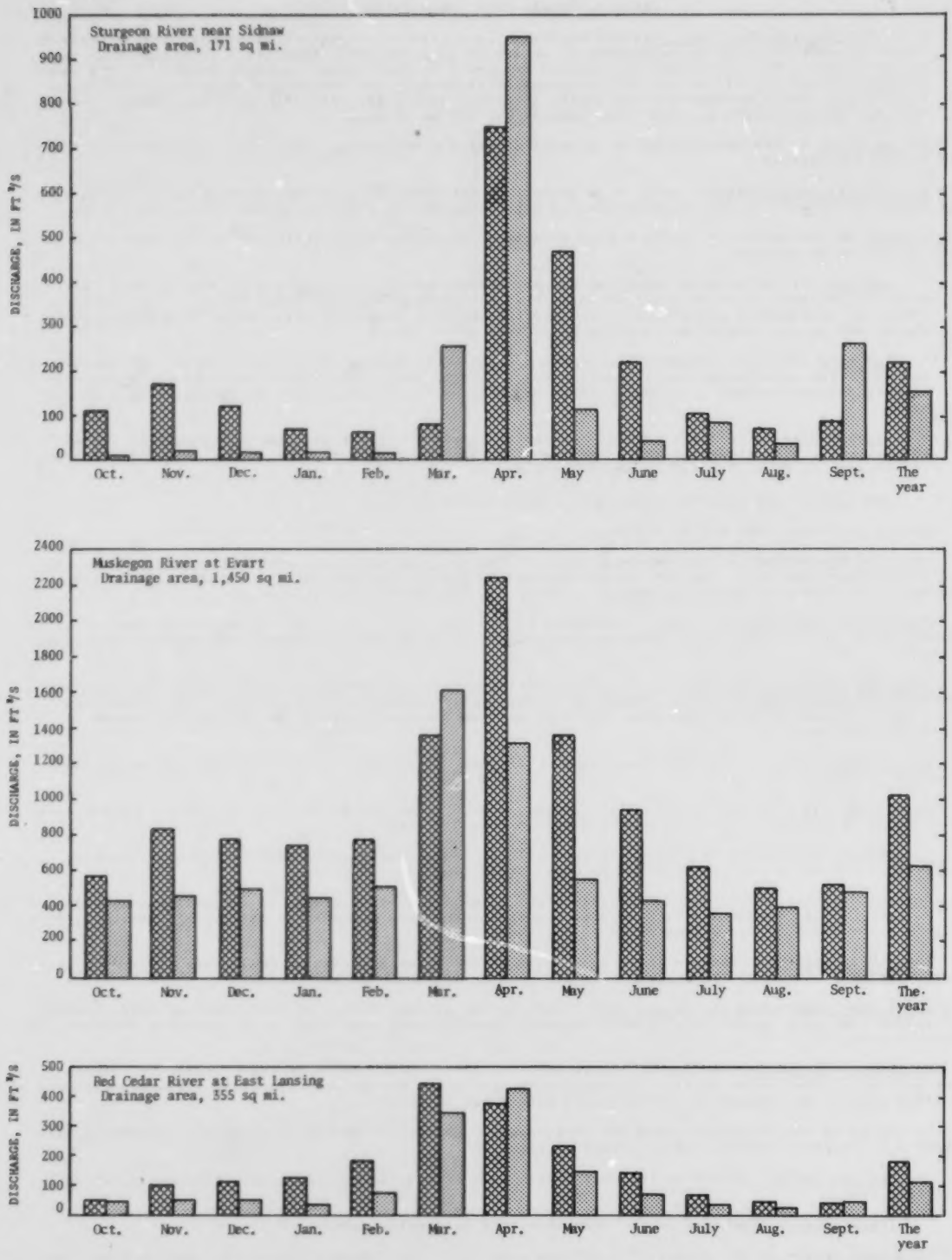

Figure 1. Discharge during 1977 water year compared with median discharge for period 1941-70 for three representative stations.

Fecal streptococcal bacteria are bacteria found also in intestines of warm-blooded animals. Their presence in water is considered to verify fecal pollution. They are characterized as gram-positive, cocci bacteria which are capable of growth in brain-heart infusion broth. In the laboratory they are defined as all the organisms which produce red or pink colonies within 48 hours at 35°C ± 1.0°C on M-enterrococcus medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Bed material is the unconsolidated material of which a streambed, lake, pond, reservoir, or estuary bottom is composed.

Biochemical oxygen demand (BOD) is a measure of the quantity of dissolved oxygen, in milligrams per liter, necessary for the decomposition of organic matter by microorganisms, such as bacteria.

Biomass is the amount of living matter present at any given time, expressed as the mass per unit area of volume of habitat.

Ash mass is the mass or amount of residue present after the residue from the dry mass determination has been ashed in a muffle furnace at a temperature of 500°C for 1 hour. The ash mass values of zooplankton and phytoplankton are expressed in grams per cubic meter (g/m^3), and periphyton and benthic organisms in grams per square meter (g/m^2).

Dry mass refers to the mass of residue present after drying in an oven at 60°C for zooplankton and 105°C for periphyton, until the mass remains unchanged. This mass represents the total organic matter, ash and sediment, in the sample. Dry mass values are expressed in the same units as ash mass.

Organic mass or volatile mass of the living substance is the difference between the dry mass and ash mass, and represents the actual mass of the living matter. The organic mass is expressed in the same units as for ash mass and dry mass.

Wet mass is the mass of living matter plus contained water.

Bottom material: See Bed material.

Cells/volume refers to the number of cells of any organism which is counted by using a microscope and grid or counting cell. Many planktonic organisms are multicelled and are counted according to the number of contained cells per sample, usually milliliters (mL) or liters (L).

Cfs-day is the volume of water represented by flow of 1 cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, approximately 1.9835 acre-feet, about 646,000 gallons or 2,447 cubic meters.

Chemical oxygen demand (COD) is a measure of the chemically oxidizable material in the water, and furnishes an approximation of the amount of organic and reducing material present. The determined value may correlate with natural water color or with carbonaceous organic pollution from sewage or industrial wastes.

Chlorophyll refers to the green pigments of plants. Chlorophyll a and b are the two most common pigments in plants.

Color unit is produced by one milligram per liter of platinum in the form of the chloroplatinate ion. Color is expressed in units of the platinum-cobalt scale.

Contents is the volume of water in a reservoir or lake. Unless otherwise indicated, volume is computed on the basis of a level pool and does not include bank storage.

Control designates a feature downstream from the gage that determines the stage-discharge relation at the gage. This feature may be a natural constriction of the channel, an artificial structure, or a uniform cross section over a long reach of the channel.

Control structure as used in this report is a structure on a stream or canal that is used to regulate the flow or stage of the stream or to prevent the intrusion of salt water.

Cubic feet per second per square mile (CFSM) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming that the runoff is distributed uniformly in time and area.

Cubic foot per second (FT^3/s, ft^3/s) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second or 448.8 gallons per minute or 0.02832 cubic meters per second.

Discharge is the volume of water (or more broadly, volume of fluid plus suspended sediment), that passes a given point within a given period of time.

Mean discharge (MEAN) is the arithmetic mean of individual daily mean discharges during a specific period.

Instantaneous discharge is the discharge at a particular instant of time.

Dissolved refers to the amount of substance present in true chemical solution. In practice, however, the term includes all forms of substance that will pass through a 0.45-micrometer membrane filter, and thus may include some very small (coloidal) suspended particles. Analyses are performed on filtered samples.

Diversity index is a numerical expression of evenness of distribution of aquatic organisms. The formula for diversity index is:

$$\bar{d} = -\sum_{i=1}^{s} \frac{n_i}{n} \log_2 \frac{n_i}{n}$$

Where n_i is the number of individuals per taxon, n is the total number of individuals, and s is the total number of taxa in the sample of the community. Diversity index values range from zero, when all the organisms in the sample are the same, to some positive number, when some or all of the organisms in the sample are different.

Drainage area of a stream at a specific location is that area, measured in a horizontal plane, enclosed by a topographic divide from which direct surface runoff from precipitation normally drains by gravity into the river above the specified point. Figures of drainage area given herein include all closed basins, or noncontribution areas, within the area unless otherwise noted.

Drainage basin is a part of the surface of the earth that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water.

Gage height (G.H.) is the water-surface elevation referred to some arbitrary gage datum. Gage height is often used interchangeably with the more general term "stage", although gage height is more appropriate when used with a reading on a gage.

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of hydrologic data are obtained.

Hardness of water is a physical-chemical characteristic that is commonly recognized by the increased quantity of soap required to produce lather. It is attributable to the presence of alkaline earths (principally calcium and magnesium) and is expressed as equivalent calcium carbonate ($CaCO_3$).

Hydrologic unit is a geographic area representing part or all of a surface drainage basin or distinct hydrologic feature as delineated by the Office of Water Data Coordination on the State Hydrologic Unit Maps; each hydrologic unit is identified by an 8-digit number.

Metamorphic stage refers to the stage of development that an organism exhibits during its transformation from an immature form to an adult form. This developmental process exists for most insects, and the degree of difference from the immature stage to the adult form varies from relatively slight to pronounced, with many intermediates. Examples of metamorphic stages of insects are egg-larva-adult or egg-nymph-adult.

Methylene blue active substance (MBAS) is a measure of apparent detergents. This determination depends on the formation of a blue color when methylene blue dye reacts with synthetic detergent compounds.

Micrograms per gram (ug/g) is a unit expressing the concentration of a chemical element as the mass (micrograms) of the element sorbed per unit mass (gram) of sediment.

Micrograms per liter (UG/L, ug/L) is a unit expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

Milligrams per liter (MG/L, mg/L) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter represent the mass of solute per unit volume (liter) of water. Concentration of suspended sediment also is expressed in mg/L, and is based on the mass of sediment per liter of water-sediment mixture.

Organism is any living entity, such as an insect, phytoplankter, or zooplankter.

Organism count/area refers to the number of organisms collected and enumerated in a sample and adjusted to the number per area habitat, usually square meters (m^2), acres, or hectares. Periphyton benthic organisms, and macrophytes are expressed in these terms.

Organism count/volume refers to the number of organisms collected and enumerated in a sample and adjusted to the number per sample volume, usually milliliters (mL) or liters (L). Numbers of planktonic organisms can be expressed in these terms.

Total organism count is the total number of organisms collected and enumerated in any particular sample.

Partial-record station is a particular site where limited streamflow and/or water-quality data are collected systematically over a period of years for use in hydrologic analyses.

Particle-size is the diameter, in millimeters (mm), of suspended sediment or bed material determined by either sieve or sedimentation methods. Sedimentation methods (pipet, bottom-withdrawal tube, visual-accumulation tube) determine fall diameter of particles in either distilled water (chemically dispersed) or in native water (the river water at the time and point of sampling).

Particle-size classification used in this report agrees with recommendations made by the American Geophysical Union Subcommittee on Sediment Terminology.

The classification is as follows:

Classification	Size (mm)	Method of analysis
Clay	0.00024 - 0.004	Sedimentation
Silt	.004 - .062	Sedimentation
Sand	.062 - 2.0	Sedimentation or sieve
Gravel	2.0 - 64.0	Sieve

The particle-size distributions given in this report are not necessarily representative of all particles in transport in the stream. Most of the organic material is removed and the sample is subjected to mechanical and chemical dispersion before analysis in distilled water. Chemical dispersion is not used for native water analysis.

Percent composition is a unit for expressing the ratio of a particular part of a sample or population to the total sample or population, in terms of types, numbers, mass or volume.

Periphyton is the assemblage of microorganisms attached to and growing upon solid surfaces. While primarily consisting of algae, they also include bacteria, fungi, protozoa, rotifers, and other small organisms. Periphyton is a useful indicator of water quality.

Pesticides are chemical compounds used to control undesirable plants and animals. Major categories of pesticides include insecticides, miticides, fungicides, herbicides, and rodenticides. Insecticides and herbicides, which control insects and plants respectively, are the two categories reported.

Picocurie (PC, pCi) is one trillionth (1×10^{12}) of the amount of radioactivity represented by a curie (Ci). A curie is the amount of radio activity that yields 3.7×10^{10} radio active disintegrations per second. A picocurie yields 2.22 dpm (disintegrations per minute).

Plankton is the community of suspended, floating, or weakly swimming organisms that live in the open water of lakes and rivers.

Phytoplankton is the plant part of the plankton. They are usually microscopic and their movement is subject to the water currents. Phytoplankton growth is dependent upon solar radiation and nutrient substances. Because they are able to incorporate as well as release materials to the surrounding water, the phytoplankton have a profound effect upon the quality of the water. They are the primary food producers in the aquatic environment, and are commonly known as algae.

Blue-green algae are a group of phytoplankton organisms having a blue pigment, in addition to the green pigment called chlorophyll. Blue-green algae often cause nuisance conditions in water.

Diatoms are the unicellular or colonial algae having a siliceous shell. Their concentrations are expressed as number of cells/mL of sample.

Green algae have chlorophyll pigments similar in color to those of higher green plants. Some forms produce algal mats or floating "moss" in lakes. Their concentrations are expressed as number of cells/mL of sample.

Zooplankton is the animal part of the plankton. Zooplankton are capable of extensive movements within the water column, and are often large enough to be seen with the unaided eye. Zooplankton are secondary consumers feeding upon bacteria, phytoplankton, and detritus. Because they are the grazers in the aquatic environment, the zooplankton are a vital part of the aquatic food web. The zooplankton community is dominated by small crustaceans and rotifers.

Polychlorinated biphenyls (PCBs) are industrial chemicals that are mixtures of chlorinated biphenyl compounds having various percentages of chlorine. They are similar in structure to organochlorine insecticides.

Primary productivity is a measure of the rate at which new organic matter is formed and accumulated through photosynthetic and chemosynthetic activity of producer organisms (chiefly green plants). The rate of primary production is estimated by measuring the amount of oxygen released (oxygen method) or the amount of carbon assimilated by the plants (carbon method).

Milligrams of carbon per area or volume per unit time [mg C/(m^2·time)] for periphyton and macrophytes and [mg C/(m^3·time)] for phytoplankton are units for expressing primary productivity. They define the amount of carbon dioxide consumed as measured by radioactive carbon (carbon 14). The carbon 14 method is of greater sensitivity than the oxygen light and dark bottle method, and is preferred for use in unenriched waters. Unit time may be either the hour or day, depending on the incubation period.

Milligrams of oxygen per area or volume per unit time [mg O_2/(m^2·time)] for periphyton and macrophytes and [mg O_2/(m^3·time)] for phytoplankton are the units for expressing primary productivity. They define production and respiration rates as estimated from changes in the measured dissolved oxygen concentration. The oxygen light and dark bottle method is preferred if the rate of primary production is sufficient for accurate measurements to be made within 24 hours. Unit time may be either the hour or day, depending on the incubation period.

Runoff in inches (IN, in) shows the depth to which the drainage area would be covered if all the runoff for a given time period were uniformly distributed on it.

Sediment is solid material that originates mostly from disintegrated rocks and is transported by, suspended in, or deposited from water; it includes chemical and biochemical precipitates and decomposed organic material, such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are influenced by environmental factors. Some major factors are degree of slope, length of slope, soil characteristics, land usage, and quantity and intensity of precipitation.

Suspended sediment is the sediment that at any given time is maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid.

Suspended-sediment concentration is the velocity-weighted concentration of suspended sediment in the sampled zone (from the water surface to a point approximately 0.3 ft above the bed) expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/L).

Suspended-sediment discharge (tons/day) is the rate at which dry weight of sediment passes a section of a stream or is the quantity of sediment, as measured by dry weight or volume, that passes a section in a given time. It is computed by multiplying discharge times mg/L times 0.0027.

Suspended-sediment load is quantity of suspended sediment passing a section in a specified period.

Total sediment discharge (tons/day) is the sum of the suspended-sediment discharge and the bed-load discharge. It is the total quantity of sediment, as measured by dry weight or volume, that passes a section during a given time.

Mean concentration is the time-weighted concentration of suspended sediment passing a stream section during a 24-hour day.

Solute is any substance derived from the atmosphere, vegetation, soil, or rocks that is dissolved in water.

Specific conductance is a measure of the ability of a water to conduct an electrical current. It is expressed in micromhos per centimeter at 25°C. Specific conductance is related to the type and concentration of ions in solution and can be used for approximating the dissolved-solids content of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is about 65 percent of the specific conductance (in micromhos). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

Stage-discharge relation is the relation between gage height (stage) and volume of water per unit of time, flowing in a channel.

Streamflow is the discharge that occurs in a natural channel. Although the term "discharge" can be applied to the flow of a canal, the word "streamflow" uniquely describes the discharge in a surface stream course. The term "streamflow" is more general than "runoff" as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

Substrate is the physical surface upon which an organism lived.

Natural substrates refers to any naturally occurring emersed or submersed solid surface, such as a rock or tree, upon which an organism lived.

Artificial substrate is a device which is purposely placed in a stream or lake for colonization of organisms. The artificial substrate simplifies the community structure by standardizing the substrate from which each sample is taken. Examples of artificial substrates are basket samplers (made of wire cages filled with clean streamside rocks) and multi-plate samplers (made of hardboard) for benthic organism collection, and plexiglass strips for periphyton collection.

Surface area of a lake is that area outlined on the latest U.S.G.S. topographic map as the boundary of the lake and measured by a planimeter in acres. In localities not covered by topographic maps, the areas are computed from the best maps available at the time planimetered. All areas shown are those for the stage when the planimetered map was made.

Surficial bed material is that part (0.1 to 0.2 ft) of the bed material that is sampled using U.S. Series Bed-Material Samplers.

Suspended (as used in tables of chemical analyses) refers to the amount (concentration) of the total concentration in a water-sediment mixture. The water-sediment mixture is associated with (or sorbed on) that material retained on a 0.45 micrometer filter.

Taxonomy is the division of biology concerned with the classification and naming of organisms. The classification of organisms is based upon a hierarchical scheme beginning with Kingdom and ending with Species at the base. The higher the classification level, the fewer features the organisms have in common. For example, the taxonomy of a particular mayfly, Hexagenia limbata is the following:

Kingdom	Animal
Phylum	Arthropoda
Class	Insecta
Order	Ephemeroptera
Family	Ephemeridae
Genus	Hexageria
Species	Hexagenia limbata

Time-weighted average is computed by multiplying the number of days in the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the total number of days. A time-weighted average represents the composition of water that would be contained in a vessel or reservoir that had received equal quantities of water from the stream each day for the year.

Tons per acre-foot indicates the dry mass of dissolved solids in 1 acre-foot of water. It is computed by multiplying the concentration in milligrams per liter by 0.00136.

Tons per day is the quantity of substance in solution or suspension that passes a stream section during a 24-hour day.

Total load (tons) is the total quantity of any individual constituent, as measured by dry mass or volume, that is dissolved in a specific amount of water (discharge) during a given time. It is computed by multiplying the total discharge, times the mg/L of the constituent, times the factor 0.0027, times the number of days.

Weighted average is used in this report to indicate discharge-weighted average. It is computed by multiplying the discharge for a sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the sum of the discharges. A discharge-weighted average approximates the composition of water that would be found in a reservoir containing all the water passing a given location during the water year after thorough mixing in the reservoir.

WDR is used as an abbreviation for "Water-Data Report: in reference to published reports beginning in 1975.

WRD is used as an abbreviation for "Water-Resources Data" in the REVISED RECORDS paragraph to refer to State annual basic-data reports published before 1975.

WSP is used as an abbreviation for "Water-Supply Paper" in references to previously published reports.

DOWNSTREAM ORDER AND STATION NUMBER

Since October 1, 1950, the order of listing hydrologic-station records in Survey reports is in a downstream direction along the main stream. All stations on a tributary entering upstream from a main-stream station are listed before that station. A station on a tributary that enters between two main-stream stations is listed between them. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. The rank of any tributary on which a station is situated with respect to the stream to which it is immediately tributary is indicated by an indention in a list of stations in the front of the report. Each indention represents one rank. This downstream order and system of indention show which stations are on tributaries between any two stations and the rank of the tributary on which each station is situated.

As an added means of identification, each hydrologic station, and partial-record station has been assigned a station number. These are in the same downstream order used in this report. In assigning station numbers, no distinction is made between partial-record and continuous-record stations; therefore, the station number for a partial-record station indicates downstream-order position in a list made up of both types of stations. Gaps are left in the series of numbers to allow for new stations that may be established; hence, the numbers are not consecutive. The complete 8-digit number for each station, such as 04058500, which appears just to the left of the station name, includes the 2-digit part number "04" plus the 6-digit downstream order number "058500".

NUMBERING SYSTEM FOR WELLS

Each well is identified by means of (1) a 15-digit number that is based on the grid system of latitude and longitude followed by (2) a local number that is provided for continuity with older reports and for other use as dictated by local needs.

Each well is located as a point on a map by a number based on the universal system of latitude and longitude. In this report, this is the first set of numbers shown for each well. For maximum utility, latitude and longitude numbers are determined to seconds. The first six digits denote degrees, minutes, and seconds of north latitude; the next seven digits denote degrees, minutes, and seconds of west longitude. The last two numbers are sequential numbers assigned in the order that the wells were recorded within a designated latitude-longitude grid.

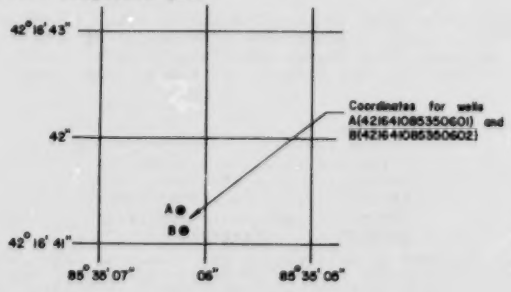

Figure 2. System for numbering wells (latitude and longitude).

The local well number indicates the location of wells within the rectangular subdivision of land with reference to the Michigan meridian and base line. The first two segments of the well number designate township and range, the third segment of the number designates the section and the letters A thru D designate successively smaller subdivisions of the section as shown in figure 3. Thus, a well designated as 32N 6E 16CCCB would be located to the nearest 2.5 acres (1 hectare) and would be within the shaded area in section 16. In the event that two or more wells are located in the same 2.5 acre (1 hectare) tract, a sequential number designation follows the letter designations--for example, 16CCCB1, 16CCCB2, 16CCCB3, etc.

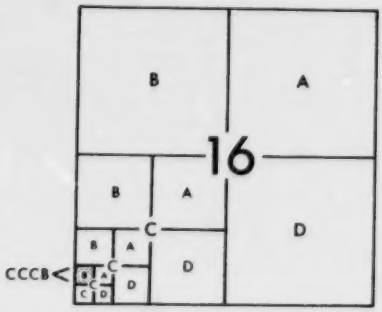

Figure 3. Well numbering system in Michigan.

SPECIAL NETWORKS AND PROGRAMS

Hydrologic bench-mark station is one that provides hydrologic data for a basin in which the hydrologic regimen will likely be governed solely by natural conditions. Data collected at a bench-mark station may be used to separate effects of natural from manmade changes in other basins which have been developed and in which the physiography, climate, and geology are similar to those in the undeveloped bench-mark basin.

National stream-quality accounting network (NASQAN) is a data collection network designed by the U.S. Geological Survey to meet many of the information demands of agencies or groups involved in national or regional water-quality planning and management. Both accounting and broad-scale monitoring objectives have been incorporated in the network design. Areal configuration of the network is based on river-basin accounting units (identified by 8-digit hydrologic-unit numbers) designated by the Office of Water Data Coordination in consultation with the Water Resources Council. Primary objectives of the network are (1) to depict areal variability of streamflow and water-quality conditions nationwide on a year-by-year basis and (2) to detect and assess long-term changes in stream quality.

Pesticide program is a network of regularly sampled water-quality stations where samples are collected to determine the concentration and distribution of pesticides in streams where potential contamination could result from the application of the commonly used insecticides and herbicides. Operation of the network is a Federal interagency activity.

Radiochemical program is a network of regularly sampled water-quality stations where samples are collected to be analyzed for radioisotopes. The streams that are sampled represent major drainage basins in the conterminous United States.

Tritium network is a network of stations which has been established to provide baseline information on the occurrence of tritium in the Nation's surface waters. In addition to the surface-water stations in the network, tritium data are also obtained at a number of precipitation stations. The purpose of the precipitation stations is to provide an estimate sufficient for hydrologic studies of the tritium input to the United States.

EXPLANATION OF STAGE AND WATER-DISCHARGE

Collection and computation of data

The base data collected at gaging stations consist of records of stage and measurements of discharge of streams or canals, and stage, surface area, and contents of lakes or reservoirs. In addition, observations of factors affecting the stage-discharge relation or the stage-capacity relation, weather records, and other information are used to supplement base data in determining the daily flow or volume of water in storage. Records of stage are obtained from either direct readings on a nonrecording gage or from a water-stage recorder that gives either a continuous graph of the fluctuations or a tape punched at selected time intervals. Measurements of discharge are made with a current meter, using the general methods adopted by the Geological Survey. These methods are described in standard textbooks, in Water-Supply Paper 888, and in U.S. Geological Survey Techniques of Water Resources Investigations, book 3, chapter A6.

For stream-gaging stations, rating tables giving the discharge for any stage are prepared from stage-discharge relation curves. If extensions to the rating curves are necessary to express discharge greater than measured, they are made on the basis of indirect measurements of peak discharge (such as slope-area or contracted-opening measurements, computation of flow over dams or weirs), step-backwater techniques, velocity-area studies, and logarithmic plotting. The daily mean discharge is computed from gage heights and rating tables, then the monthly and yearly mean discharge are computed from the daily figures. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features that form the control, the daily mean discharge is computed by the shifting-control method, in which correction factors based on individual discharge measurements and notes by engineers and observers are used in applying the gage heights to the rating tables. If the stage-discharge relation for a station is temporarily changed by the presence of aquatic growth or debris on the control, the daily mean discharge is computed by what is basically the shifting-control method.

At some stream-gaging stations the stage-discharge relation is affected by backwater from reservoirs, tributary streams, or other sources. This necessitates the use of the slope method in which the slope or fall in a reach of the stream is a factor in computing discharge. The slope or fall is obtained by means of an auxiliary gage set at some distance from the base gage. At some stations the stage-discharge relation is affected by changing stage; at these stations the rate of change in stage is used as a factor in computing discharge.

At some northern stream-gaging stations the stage-discharge relation is affected by ice in the winter, and it becomes impossible to compute the discharge in the usual manner. Discharge for periods of ice effect is computed on the basis of the gage-height record and occasional winter discharge measurements. Consideration is given to the available information on temperature and precipitation, notes by gage observers and hydrologist, and comparable records of discharge for other stations in the same or nearby basins.

For a lake or reservoir station, capacity tables giving the contents for any stage are prepared from stage-area relation curves defined by surveys. The application of the stage to the capacity table gives the contents, from which the daily, monthly, or yearly change in contents is computed.

If the stage-capacity curve is subject to changes because of deposition of sediment in the reservoir, periodic resurveys of the reservoir are necessary to define new stage-capacity curves. During the period between reservoir surveys the computed contents may be increasingly in error due to the gradual accumulation of sediment.

For some gaging stations there are periods when no gage-height record is obtained or the recorded gage height is so faulty that it cannot be used to compute daily discharge or contents. This happens when the recorder stops or otherwise fails to operate properly, intakes are plugged, the float is frozen in the well, or for various other reasons. For such periods the daily discharges are estimated on the basis of recorded range in stage, prior and subsequent records, discharge measurements, weather records, and comparison with records for other stations in the same or nearby basins. Likewise, daily contents may be estimated on the basis of operator's log, prior and subsequent records, inflow-outflow studies, and other information.

The data in this report generally comprise a description of the station and tabulations of daily and monthly figures. For gaging stations on streams or canals a table showing the daily discharge and monthly and yearly discharge is given. For gaging stations on lakes and reservoirs a monthly summary table of stage and contents or a table showing the daily contents is given. Tables of daily mean gage heights are included for some streamflow stations and for some reservoir stations. Records are published for the water year which begins on October 1 and ends on September 30.

The description of the gaging stations gives the location, drainage area, period of record, notations of revisions of previously published records, type and history of gages, general remarks, average discharge, and extremes of discharge or contents. The location of the gaging station and the drainage area are obtained from the most accurate maps available. River mileage, given under "LOCATION" for some stations, is that determined and used by the Corps of Engineers or other agencies. Periods for which there are published records for the present station or for stations generally equivalent to the present one are given under "PERIOD OF RECORD."

Previously published streamflow records of some stations have been found to be in error on the basis of data or information later obtained. Revisions of such records are usually published along with the current records in one of the annual or compilation reports. In order to make it easier to find such revised records, a paragraph headed "REVISED RECORDS" has been added to the description of

all stations for which revised records have been published. Listed therein are all the reports in which revisions have been published, each followed by the water years for which figures are revised in that report. In listing the water years only one number is given; for instance, 1965 stands for the water October 1, 1964, to September 30, 1965. If no daily, monthly, or annual figures of discharge are affected by the revision, the fact is brought out by notations after the year dates as follows: "(M)" means that only the instantaneous maximum discharge was revised; "(m)" that only the instantaneous minimum was revised; and "(P)" that only peak discharges were revised. If the drainage area has been revised, the report in which the revised figure was first published is given. It should be noted that for all stations for which cubic feet per second per square mile and runoff in inches are published, a revision of the drainage area necessitates corresponding revision of all figures based on the drainage area. Revised figures of cubic feet per second per square mile and runoff in inches resulting from a revision of the drainage area only are usually not published in the annual series of reports.

The type of gage currently in use, the datum of the present gage above mean sea level, and a condensed history of the types, locations, and datums of previous gages used during the period of record are given under "GAGE." In references to datum of gage, the phrase "mean sea level" denotes "Sea Level Datum of 1929" as used by the Topographic Division of the Geological Survey unless otherwise qualified.

Information pertaining to the accuracy of the discharge records and to conditions which affect the natural flow of the gaging station is given under "REMARKS." For reservoir stations information on the dam forming the reservoir, the capacity, outlet works and spillway, and purpose and use of the reservoir is given under "REMARKS."

The average discharge for the number of years indicated is given under "AVERAGE DISCHARGE"; it is not given for stations having fewer than 5 complete years of record or for stations where changes in water development during the period of record cause the figure to have little significance. Under "EXTREMES" are given first, the extremes for the period of record, second, information available outside the period of record, and last, those for the current year. Unless otherwise qualified, the maximum discharge (or contents) is the instantaneous maximum corresponding to the crest stage obtained by use of a water-stage recorder (graphic or digital), a crest-stage gage, or a nonrecording gage read at the time of the crest. If the maximum gage height did not occur on the same day as the maximum discharge (or contents), it is given separately. Similarly, the minimum is the instantaneous minimum unless otherwise qualified. For some stations peak discharges are listed with "EXTREMES FOR THE CURRENT YEAR"; if they are, all independent peaks, including the maximum for the year, above the selected base with the time of occurrence and corresponding gage heights are published in tabular format. The base discharge, which is given in the table heading, is selected so that an average of about three peaks a year will be presented. Peak discharges are not published for any canals, ditches, drains, or for any stream for which the peaks are subject to substantial control by man. Time of day is expressed in 24-hour local standard time; for example, 12:30 a.m. is 0030, 1:30 p.m. is 1330. The minimums for these stations are published in a separate paragraph following the table of peaks.

The daily table for stream-gaging stations gives the mean discharge for each day and is followed by monthly and yearly summaries. In the monthly summary below the daily table, the line headed "TOTAL" gives the sum of the daily figures. The line headed "MEAN" gives the average flow in cubic feet per second during the month. The lines headed "MAX" and "MIN" give the maximum and minimum daily discharges, respectively, for the month. Discharge for the month also may be expressed in cubic feet per second per square mile (line headed "CFSM"), or in inches (line headed "IN."), or in acre-feet (line headed "AC-FT"). Figures for cubic feet per second per square mile and runoff in inches are omitted if there is extensive regulation or diversion, if the drainage area includes large noncontributing areas, or if the average annual rainfall over the drainage basin is usually less than 20 inches. In the yearly summary below the monthly summary, the figures shown are the appropriate daily discharges for the calendar and water years.

Footnotes to the table of daily discharges are introduced by the word "NOTE." Footnotes are used to indicate periods for which the discharge is computed or estimated by special methods because of no gage-height record, backwater from various sources, or other unusual conditions. Periods of no gage-height record are indicated if the period is continuous for a month or more or includes the maximum discharge for the year. Periods of backwater from an unusual source, of indefinite stage-discharge relation, or of any other unusual condition at the gage site are indicated only if they are a month or more in length and the accuracy of the records is affected. Days on which the stage-discharge relation is affected by ice are not indicated. The methods used in computing discharge for various unusual conditions have been explained in preceding paragraphs.

For most gaging stations on lakes and reservoirs the data presented comprise a description of the station and a monthly summary table of stage and contents. For some reservoirs a table showing daily contents or stage is given. A skeleton table of capacity at given stages is published for most reservoirs for which records are published on a daily basis, but is not published for reservoirs for which only monthly data are given.

Data collected at partial-record stations follow the information for continuous-record sites. Data for partial-record discharge stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations, and the second is a table of annual maximum stage and discharge at crest-stage stations. The tables of partial-record stations are followed by a listing of discharge measurements made at sites other than continuous-record or partial-record stations. Occasionally, a series of discharge measurements are made within a short time period to investigate the seepage gains or losses along a reach of a stream or to determine the low-flow characteristics of an area. Such measurements are also given in special tables following the tables of partial-record stations.

Accuracy of data

The accuracy of streamflow data depends primarily on (1) the stability of the stage-discharge relation or, if the control is unstable, the frequency of discharge measurements, and (2) the accuracy of observations of stage, measurements of discharge, and interpretation of records.

The station description under "REMARKS" states the degree of accuracy of the records. "Excellent" means that about 95 percent of the daily discharges are within 5 percent; "good" within 10 percent; and "fair" within 15 percent. "Poor" means that daily discharges have less than "fair" accuracy.

Figures of daily mean discharge in this report are shown to the nearest hundredth of a cubic foot per second for discharges of less than 1 cfs; to tenths between 1.0 and 10 cfs; to whole numbers between 10 and 1,000 cfs; and to 3 significant figures above 1,000 cfs. The number of significant figures used is based solely on the magnitude of the figure. The same rounding rules apply to discharge figures listed for partial-record stations.

Discharge at many stations, as indicated by the monthly mean, may not reflect natural runoff due to the effects of diversion, consumption, regulation by storage, increase or decrease in evaporation due to artificial causes, or to other factors. For such stations, figures of cubic feet per second per square mile and of runoff in inches are not published unless satisfactory adjustments can be made for diversions, for changes in contents of reservoirs, or for other changes incident to use and control. Evaporation from a reservoir is not included in the adjustments for changes in reservoir contents, unless it is so stated. Even at those stations where adjustments are made, large errors in computed runoff may occur if adjustments or losses are large in comparison with the observed discharge.

Other data available

Information of a more detailed nature than that published for most of the gaging stations, such as observations of water temperatures, discharge measurements, gage-height records, and rating tables, is on file in the district office. Also, most gaging-station records are available in computer-usable form and many statistical analyses have been made.

Information on the availability of unpublished data or statistical analyses may be obtained from the district office.

EXPLANATION OF WATER QUALITY RECORDS

Collection and examination of data

Surface-water samples for analyses usually are collected at or near gaging stations. The quality-of-water records are given immediately following the discharge records at these stations.

The descriptive heading for water-quality records gives the period of record for all water-quality data; the period of daily record for parameters that are measured on a daily basis (specific conductance, pH, dissolved oxygen, water temperature, sediment discharge, etc.); extremes for the period of daily record; extremes for the current year; and general remarks.

For ground-water records, no descriptive statements are given; however, the well number, depth of well, date of sampling and/or other pertinent data are given in the table containing the chemical analyses of the ground water.

Water analysis

Most methods for collecting and analyzing water samples are described in the U.S. Geological Survey Techniques of Water Resources Investigations listed on a following page.

One sample can define adequately the water quality at a given time if the mixture of solutes throughout the stream cross section is homogeneous. However, the concentration of solutes at different locations in the cross section may vary widely with different rates of water discharge, depending on the source of material and the turbulence and mixing of the stream. Some streams must be sampled through several vertical sections to obtain a representative sample needed for an accurate mean concentration and for use in calculating load.

Chemical-quality data published in this report are considered to be the most representative values available for the stations listed. The values reported represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. In the rare case where an apparent inconsistency exists between a reported pH value and the relative abundance of carbon dioxide species (carbonate and bicarbonate), the inconsistency is the result of a slight uptake of carbon dioxide from the air by the sample between measurement of pH in the field and determination of carbonate and bicarbonate in the laboratory.

For chemical-quality stations equipped with digital monitors, the records consist of daily maximum, minimum, and mean values for each constituent measured and are based upon hourly punches beginning at 0100 hours and ending at 2400 hours for the day of record. More detailed records (hourly values) may be obtained from the district office.

Water temperature

Water temperatures are measured at most of the water-quality stations. In addition, water temperatures are taken at time of discharge measurements for water-discharge stations. For stations where water temperatures are taken manually once or twice daily, the water temperatures are taken at about the same time each day. Large streams have a small daily temperature change; shallow streams may have a daily range of several degrees and may follow closely the changes in air temperature. Some streams may be affected by waste-heat discharge.

At stations where recording instruments are used, either mean temperatures or maximum and minimum temperatures for each day are published.

Sediment

Suspended-sediment concentrations are determined from samples collected by using depth-integrating samplers. Samples usually are obtained at several verticals in the cross section, or a single sample may be obtained at a fixed point and a coefficient applied to determine the mean concentration in the cross sections.

During periods of rapidly changing flow or rapidly changing concentration, samples may have been collected more frequently (twice daily or, in some instances, hourly). The published sediment discharges for days of rapidly changing flow or concentration were computed by the subdivided day method (time-discharge weighted average). Therefore, for those days when the published sediment discharge value differs from the value computed as the product of discharge times mean concentration times 0.0027, the reader can assume that the sediment discharge for that day was computed by the subdivided day method. For periods when no samples are collected, daily loads of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately before and after the periods, and suspended-sediment loads for other periods of similar discharge.

At other stations, suspended-sediment samples are collected periodically at many verticals in the stream cross section. Although data collected periodically may represent conditions only at the time of observation, such data are useful in establishing seasonal relations between quality and streamflow in predicting long-term sediment-discharge characteristics of the stream.

In addition to the records of the quantities of suspended sediment, records of periodic measurements of the particle-size distribution of the suspended sediment and bed material are included.

EXPLANATION OF GROUND-WATER LEVEL RECORDS

Collection of the data

Only ground-water level data from a basic national network of observation wells are published herein. This basic network contains observation wells so located (figure 9) that the most significant data are obtained from the fewest wells in the most important aquifers.

Each well is indentified by means of (1) a 15-digit number that is based on latitude and longitude, and (2) a local number that is provided for local needs. See figures 2 and 3.

Measurements are made in many types of wells under varying conditions of access and of different temperatures, hence neither the method of measurement nor the equipment can be standardized. At each observation well, however, the equipment and techniques used are those that will insure that measurements at each well are consistent.

Water-level measurements in this report are given in feet with reference to either mean sea level (msl) or land-surface datum (lsd). Mean sea level is the datum plane on which the national network of precise levels is based; land-surface datum is a datum plane that is approximately at land surface at each well. If known, the altitude of the land-surface datum above mean sea level is given in the well description. The height of the measuring point (MP) above or below land-surface datum is given in each well description. Water levels in wells equipped with recording gages are reported for every fifth day and the end of each month (eom).

Water levels are reported to as many significant figures as can be justified by the local conditions. For example, in a measurement of a depth to water of several hundred feet, the error of determining the absolute value of the total depth to water may be a few tenths of a foot, whereas the error in determining the net change of water level between successive measurements may be only a hundredth or a few hundredths of a foot. For lesser depths to water, the accuracy is greater. Accordingly, most measurements are reported to a hundredth of a foot, but some are given only to a tenth of a foot or a larger unit.

Thirty-four manuals by the U.S. Geological Survey have been published to date in the series on techniques describing procedures for planning and executing specialized work in water-resources investigations. The material is grouped under major subject headings called books and is further divided into sections and chapters. For example, Section A of Book 3 (Applications of Hydraulics) is on surface water. The chapter, the unit of publication, is limited to a narrow field of subject matter. This format permits flexibility in revision and publication as the need arises. The reports listed below are for sale by the U.S. Geological Survey, Branch of Distribution, 1200 South Eads Street, Arlington, VA 22202 (authorized agent of the Superintendent of Documents, Government Printing Office. Prices are effective January 1978 but are subject to change.

NOTE: When ordering any of these publications, please give the title, book number, chapter number, and "U.S. Geological Survey Techniques of Water-Resources Investigations".

1-D1. *Water temperature-influential factors, field measurement, and data presentation*, by H. H. Stevens Jr., J. F. Ficke, and G. F. Smoot: USGS--TWRI Book 1, Chapter D1. 1975. 65 pages. $1.60.

1-D2. *Guidelines for collection and field analysis of ground-water samples for selected unstable constituents*, by W.W.Wood: USGS--TWRI Book 1, Chapter D2. 1976. 24 pages. $0.85

2-D1. *Application of surface geophysics to ground-water investigations*, by A. A. R. Zohdy, G. P. Eaton, and D. R. Mabey: USGS--TWRI Book 2, Chapter D1. 1974. 116 pages. $1.90.

2-E1. *Application of borehole geophysics to water-resources investigations*, by W. S. Keys and L. M. MacCary: USGS--TWRI Book 2, Chapter E1. 1971. 126 pages. $1.75.

3-A1. *General field and office procedures for indirect discharge measurements*, by M. A. Benson and Tate Dalrymple: USGS--TWRI Book 3, Chapter A1. 1967. 30 pages. $1.00.

3-A2. *Measurement of peak discharge by the slope-area method*, by Tate Dalrymple and M. A. Benson: USGS--TWRI Book 3, Chapter A2. 1967. 12 pages. $0.35.

3-A3. *Measurement of peak discharge at culverts by indirect methods*, by G. L. Bodhaine: USGS--TWRI Book 3, Chapter A3. 1968. 60 pages. $0.40.

3-A4. *Measurement of peak discharge at width contractions by indirect methods*, by H. F. Matthai: USGS--TWRI Book 3, Chapter A4. 1967. 44 pages. $1.00.

3-A5. *Measurement of peak discharge at dams by indirect methods*, by Harry Hulsing: USGS--TWRI Book 3, Chapter A5. 1967. 29 pages. $0.35.

3-A6. *General procedure for gaging streams*, by R. W. Carter and Jacob Davidian: USGS--TWRI Book 3, Chapter A6, 1968, 13 pages. $1.00.

3-A7. *Stage measurements at gaging stations*, by T. J. Buchanan and W. P. Somers: USGS--TWRI Book 3, Chapter A7. 1968. 28 pages. $1.40.

3-A8. *Discharge measurements at gaging stations*, by T. J. Buchanan and W. P. Somers: USGS--TWRI Book 3, Chapter A8. 1969. 65 pages. $1.25.

3-A11. *Measurement of discharge by moving-boat method*, by G. F. Smoot and C. E. Novak: USGS--TWRI Book 3, Chapter A11. 1969. 22 pages. $1.20.

3-A12. *Fluorometric procedures for dye tracing*, by J. F. Wilson Jr.: USGS--TWRI Book 3, Chapter A12. 1968. 31 pages. $0.35. Not currently available.

3-B1. *Aquifer-test design, observation, and data analysis*, by R. W. Stallman: USGS--TWRI Book 3, Chapter B1. 1971. 26 pages. $0.70.

3-B2. *Introduction to ground-water hydraulics, a programed text for self-instruction*, by G. D. Bennett: USGS--TWRI Book 3, Chapter B2 1976. 172 pages. $2.50.

3-C1. *Fluvial sediment concepts*, by H. P. Guy: USGS--TWRI Book 3, Chapter C1. 1970. 55 pages. $0.65.

3-C2. *Field methods for measurement of fluvial sediment*, by H. P. Guy and V. W. Norman: USGS--TWRI Book 3, Chapter C2, 1970. 59 pages. $2.50.

3-C3. *Computation of fluvial-sediment discharge*, by George Porterfield: USGS--TWRI Book 3, Chapter C3. 1972. 66 pages. $2.10.

4-A1. *Some statistical tools in hydrology*, by H. C. Riggs: USGS--TWRI Book 4 Chapter A1 1968. 39 pages. $1.60.

4-A2. *Frequency curves*, by H. C. Riggs: USGS--TWRI Book 4, Chapter A2. 1968. 15 pages. $0.35.

4-B1. *Low-flow investigations*, by H. C. Riggs: USGS--TWRI Book 4, Chapter B1. 1972, 18 pages. $0.65.

4-B2. *Storage analyses for water supply*, by H. C. Riggs and C. H. Hardison: USGS--TWRI Book 4, Chapter B2. 1973. 20 pages. $0.75.

4-B3. *Regional analyses of streamflow characteristics*, by H. C. Riggs: USGS--TWRI Book 4, Chapter B3. 1973. 15 pages. $0.65.

4-D1. *Computation of rate and volume of stream depletion by wells*, by C. T. Jenkins: USGS--TWRI Book 4, Chapter D1. 1970. 17 pages. $1.10.

5-A1. *Methods for collection and analysis of water samples for dissolved minerals and gases*, by Eugene Brown, M. W. Skougstad, and M. J. Fishman: USGS--TWRI Book 5, Chapter A1. 1970. 160 pages. $2.40.

5-A2. *Determination of minor elments in water by emission spectroscopy*, by P. R. Barnett and E. C. Mallory, Jr.: USGS--TWRI Book 5, Chapter A2. 1971. 31 pages. $0.80.

5-A3. *Methods for analysis of organic substances in water*, by D. F. Goerlitz and Eugene Brown: USGS--TWRI Book 5, Chapter A3. 1972. 40 pages. $0.90.

5-A4.* *Methods for collection and analysis of aquatic biological and microbiological samples*, edited by P.E. Greeson, T.A. Ehlke, G.A. Irwin, B.W. Lium, and K.V. Slack: USGS--TWRI Book 5, Chapter A4. 1977. 332 pages. $20.00.

5-A5.* *Methods for determination of radioactive substances in water and fluvial sediments*, by L.L. Thatcher, V.J. Janzer, and K.W. Edwards: USGS--TWRI Book 5, Chapter A5. 1977. 95 pages. $16.00.

5-C1. *Laboratory theory and methods for sediment analysis*, by H. P. Guy: USGS--TWRI Book 5, Chapter C1. 1969. 58 pages. $2.10.

7-C1. *Finite difference model for aquifer simulation in two dimensions with results of numerical experiments*, by P. C. Trescott, G. F. Pinder, and S. P. Larson: USGS--TWRI Book 7, Chapter C1. 1976. 116 pages. $2.30.

8-A1. *Methods of measuring water levels in deep wells*, by M. S. Garber and F. C. Koopman: USGS--TWRI Book 8, Chapter A1. 1968. 23 pages. $0.70.

8-B2. *Calibration and maintenance of vertical-axis type current meters*, by G. F. Smoot and C. E. Novak: USGS--TWRI Book 8, Chapter B2. 1968. 15 pages. $1.10.

*These publications are available ONLY from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. They are in loose-leaf format and are subscription items. Additional supplements will be issued to subscribers at no extra cost. Checks should be made payable to Superintendent of Documents. Requester should emphasize to Superintendent of Documents that this is a subscription item.

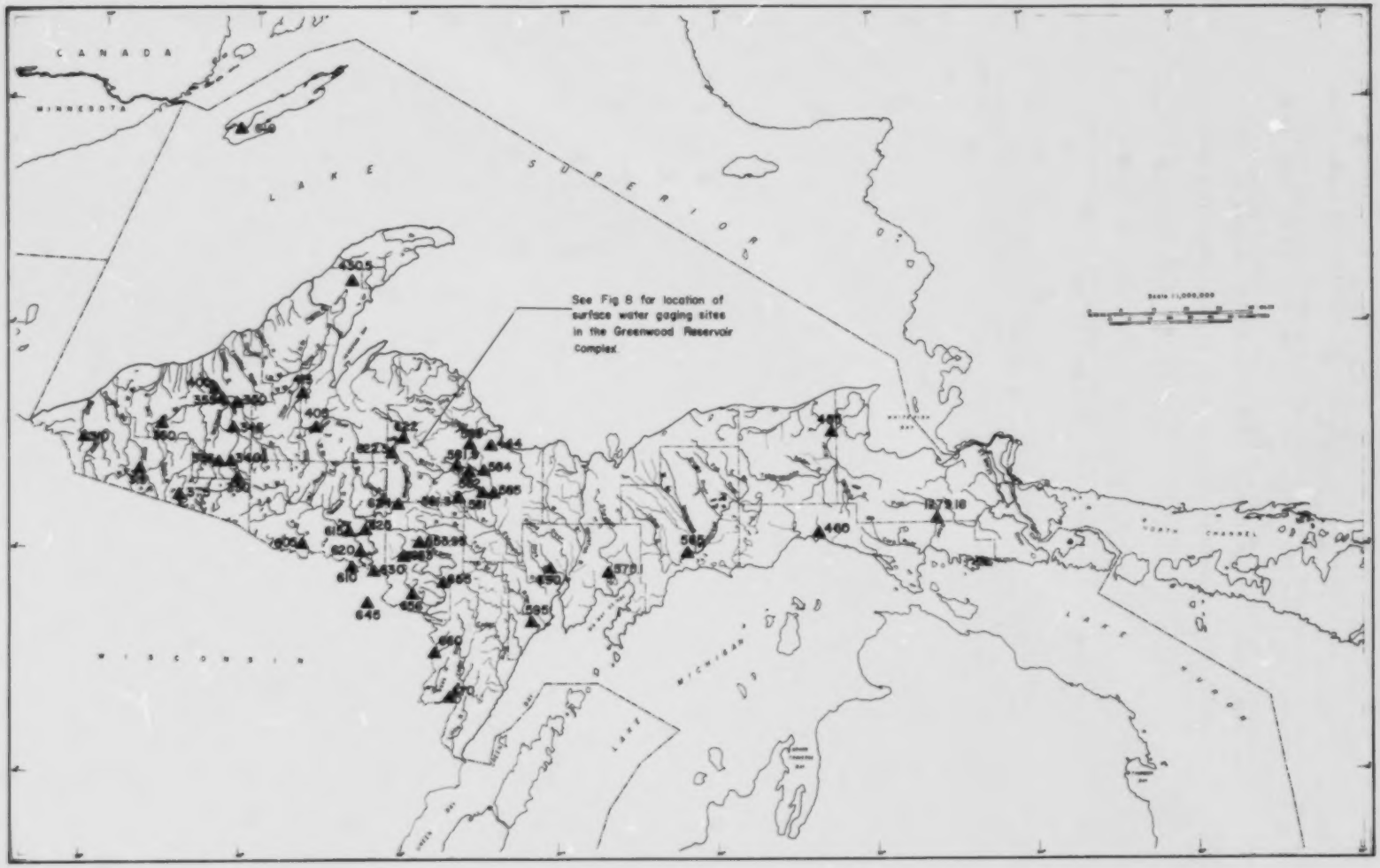

FIGURE 4.--Map showing identification number and location of gaging stations in Upper Peninsula of Michigan.

FIGURE 5.--Map showing identification number and location of gaging stations in Lower Peninsula of Michigan.

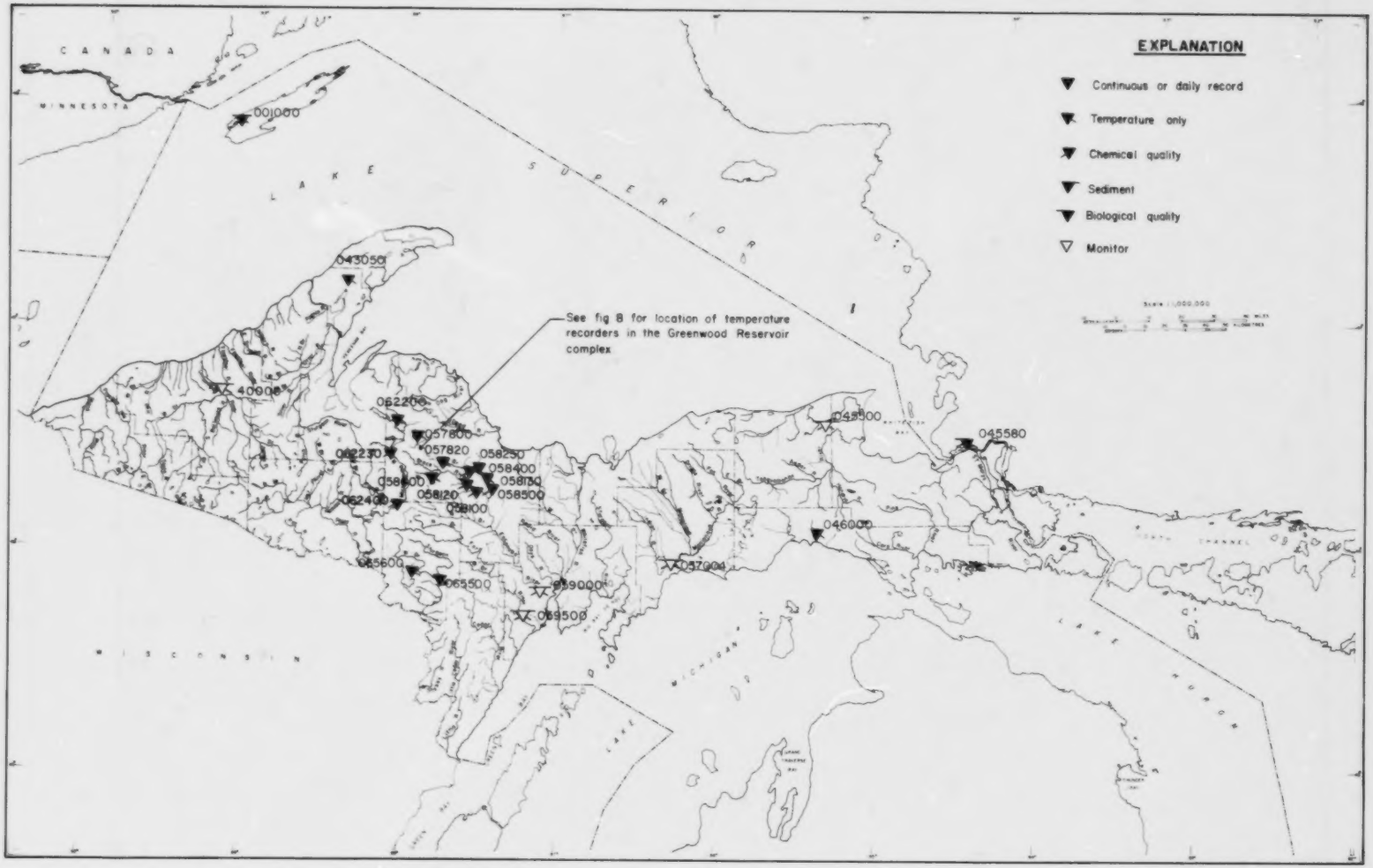

FIGURE 6.--Map showing identification number and location of water-quality stations in Upper Peninsula of Michigan.

FIGURE 7.--Map showing identification number and location of water-quality stations in Lower Peninsula of Michigan.

04001000 WASHINGTON CREEK AT WINDIGO, MI
(Hydrologic bench-mark station)

LOCATION.--Lat 47°55'23", long 89°08'42", in NW¼ sec.28, T.64 N., R.38 W., Keweenaw County, Isle Royale National Park, Hydrologic Unit 04020300, on left bank 0.8 mi (1.3 km) northeast of Windigo, and 35 mi (56 km) southwest of Rock Harbor.

DRAINAGE AREA.--13.2 mi² (34.2 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 605 ft (184 m) from topographic map (nearest 5 ft).

REMARKS.--Water-discharge records good except those for the winter period and those below 2.0 ft³/s (0.057 m³/s), which are fair. ERTS satellite telemeter and recording rain gage at station. Capacity rain gage located near mouth. Hydrologic bench-mark stations are installed in specially selected areas where water resources have not yet been affected by works of man. Continuous records of natural hydrologic conditions, such as streamflow and water quality, will make possible assessment of changes which occur as a result of changes in climate and other natural factors. These data will provide a frame of reference against which hydrologic changes wrought by man may be evaluated.

AVERAGE DISCHARGE.--13 years, 18.6 ft³/s (0.527 m³/s), 19.14 in/yr (486 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 480 ft³/s (13.6 m³/s) May 1, 1972, gage height, 6.82 ft (2.079 m), from rating curve extended above 160 ft³/s (4.53 m³/s) based on runoff characteristics of nearby stations; maximum gage height, 6.88 ft (2.097 m) Jan. 13, 1975, backwater from ice; minimum daily discharge, 0.44 ft³/s (0.012 m³/s) Aug. 25, 1977; minimum gage height, 2.55 ft (0.777 m) Aug. 29, 30, 31, Sept. 2, 3, 7, 9, 10, 11, 12, 1976.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 110 ft³/s (3.12 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Sept. 9	1200	*252	7.14	*6.02	1.835
Sept. 19	2200	216	6.12	5.80	1.768
Sept. 25	0100	248	7.02	6.00	1.829

Minimum daily discharge, 0.44 ft³/s (0.012 m³/s) Aug. 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.56	.90	.72	.60	.60	.60	27	10	3.8	2.8	2.9	40
2	.56	1.0	.70	.60	.60	.60	21	9.3	4.7	2.2	2.0	26
3	.56	1.0	.70	.60	.60	.60	18	8.4	3.8	5.8	1.7	17
4	.56	1.0	.68	.60	.60	.60	16	7.9	3.4	6.2	1.8	14
5	.56	1.1	.66	.60	.60	.60	14	8.4	3.4	6.6	1.5	12
6	.58	.99	.64	.60	.60	.60	11	8.9	7.2	12	1.3	9.2
7	.59	.86	.62	.60	.60	.60	9.0	7.9	6.7	9.2	1.1	7.7
8	.60	.76	.62	.60	.60	.60	9.0	7.3	6.3	6.6	1.0	21
9	.60	.84	.62	.60	.60	.62	9.0	6.7	5.3	5.0	.91	203
10	.60	.89	.62	.60	.62	.65	13	6.4	4.6	4.0	.84	109
11	.62	.83	.62	.60	.62	.90	24	6.1	4.4	7.7	.76	59
12	.62	.88	.62	.60	.62	3.0	32	5.7	4.0	14	.72	45
13	.62	.89	.64	.60	.62	25	35	5.4	3.4	9.8	.68	36
14	.64	.90	.65	.60	.62	45	34	4.9	3.1	6.8	.64	27
15	.66	.88	.65	.60	.62	52	33	4.4	3.1	5.6	.62	20
16	.68	.90	.65	.60	.62	45	31	4.0	3.9	4.8	.58	17
17	.72	.94	.65	.60	.62	36	30	3.9	3.6	4.8	.56	16
18	.74	1.0	.65	.60	.60	21	29	3.9	3.5	3.8	.54	15
19	.88	1.0	.65	.60	.60	9.5	27	3.5	4.2	3.4	.52	110
20	1.1	.99	.64	.60	.60	6.1	24	3.3	3.9	3.0	.50	143
21	1.1	.92	.62	.60	.60	4.7	32	3.2	3.0	2.6	.48	71
22	1.0	.81	.62	.60	.60	4.1	32	3.8	2.6	2.2	.47	50
23	1.0	.78	.62	.60	.60	3.8	27	3.9	2.3	1.9	.46	43
24	.96	.78	.60	.60	.60	3.3	24	3.7	2.3	1.8	.45	88
25	.93	.78	.60	.60	.60	2.9	20	3.4	2.0	2.5	.44	165
26	.90	.76	.60	.60	.60	2.9	18	3.1	1.9	2.0	.99	85
27	.88	.76	.60	.60	.60	6.8	15	2.9	1.8	1.6	4.5	66
28	.89	.74	.60	.60	.60	12	15	2.6	2.1	1.6	48	53
29	.94	.72	.60	.60	---	36	12	2.2	2.3	1.7	29	46
30	.94	.72	.60	.60	---	45	11	2.0	2.0	1.7	24	40
31	.93	---	.60	.60	---	38	---	2.0	---	3.9	63	---
TOTAL	23.52	26.32	19.66	18.60	16.96	409.07	652.0	159.1	108.6	146.8	192.96	1653.9
MEAN	.76	.88	.63	.60	.61	13.2	21.7	5.13	3.62	4.74	6.22	55.1
MAX	1.1	1.1	.72	.60	.62	52	35	10	7.2	14	63	203
MIN	.56	.72	.60	.60	.60	.60	9.0	2.0	1.8	1.6	.44	7.7
CFSM	.06	.07	.05	.05	.05	1.00	1.64	.39	.27	.36	.47	4.17
IN.	.07	.07	.06	.05	.05	1.15	1.84	.45	.31	.41	.54	4.66

CAL YR 1976 TOTAL 4170.12 MEAN 11.4 MAX 253 MIN .49 CFSM .86 IN 11.75
WTR YR 1977 TOTAL 3427.49 MEAN 9.39 MAX 203 MIN .44 CFSM .71 IN 9.66

04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water year 1965 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1964 to current year.

INSTRUMENTATION.--Temperature recorder since Oct. 20, 1964.

REMARKS.--Temperature recorder malfunctioned Oct. 1-19 (range in temperature 2.0 to 10.5°C), clock stopped Dec. 27 to Feb. 8 (range in temperature 0.0 to 1.0°C), Feb. 16 to Mar. 7 (range in temperature 0.5 to 1.0°C), no record Sept. 1-21. Complete ice cover during winter period. In addition to the temperature recorder record, samples were collected approximately bimonthly.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 22.0°C July 26, 30, 31, 1970, July 18, Aug. 1, 1975, July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 22.0°C July 20; minimum, 0.0°C on many days during January and February.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UM-MF (COL./100 ML)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)
OCT												
20...	1230	1.0	210	7.4	2.5	11.5	107	80	40	27	100	5
FEB												
09...	1530	.62	246	7.4	.0	12.2	85	--	--	--	120	16
MAR												
08...	1430	.60	230	7.3	.5	12.4	88	82	<1	<1	110	11
MAY												
11...	1600	5.7	128	7.4	10.0	--	--	96	B13	<1	55	--
AUG												
02...	1400	2.0	170	7.6	15.0	--	--	140	20	250	86	4
SEP												
22...	1230	54	75	6.7	10.0	10.3	94	220	B14	62	40	12

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
OCT												
20...	28	8.0	8.2	.4	.8	119	0	98	7.6	6.1	11	.1
FEB												
09...	32	9.3	7.6	.3	.7	125	0	103	8.0	6.9	13	.1
MAR												
08...	29	8.1	6.6	.3	.6	116	0	95	9.3	5.8	12	.1
MAY												
11...	14	4.9	2.3	.1	.6	--	0	--	--	18	2.6	.1
AUG												
02...	24	6.4	4.1	.2	.6	100	0	82	4.0	7.4	4.1	.0
SEP												
22...	11	3.1	1.7	.1	.5	34	0	28	11	11	2.4	.1

DATE	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER DAY)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
OCT								
20...	14	139	135	.39	.01	.04	1	.00
FEB								
09...	14	158	145	.26	.14	.02	1	.00
MAR								
08...	14	147	133	.24	.20	.02	--	--
MAY								
11...	6.0	85	--	1.31	.05	.01	--	--
AUG								
02...	12	136	108	.73	.05	.01	2	.01
SEP								
22...	10	86	57	12.5	.00	.03	13	1.9

B--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	TOTAL FILTRABLE RESIDUE (MG/L)	TOTAL NONFILTRABLE RESIDUE (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL BARIUM (BA) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)	TOTAL COPPER (CU) (UG/L)	TOTAL IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	TOTAL MANGANESE (MN) (UG/L)
OCT											
20...	1230	140	<1	0	0	0	<10	0	600	1	30
MAY											
11...	1600	--	--	1	0	0	<10	4	420	4	20

DATE	TOTAL MERCURY (HG) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)	DISSOLVED GROSS ALPHA AS U-NAT. (UG/L)	SUSPENDED GROSS ALPHA AS U-NAT. (UG/L)	DISSOLVED GROSS BETA AS CS-137 (PC/L)	SUSPENDED GROSS BETA AS CS-137 (PC/L)	DISSOLVED GROSS BETA AS SR90/Y90 (PC/L)	SUSPENDED GROSS BETA AS SR90/Y90 (PC/L)	DISSOLVED RA-226 (RADON METHOD) (PC/L)
OCT											
20...	<.5	0	0	10	<1.3	<.4	2.9	<.4	2.3	<.4	.04
MAY											
11...	.0	0	0	10	--	--	--	--	--	--	--

DATE	DISSOLVED URANIUM (U) (UG/L)	CYANIDE (CN) (MG/L)	TOTAL PCB (UG/L)	PCB IN BOTTOM MATERIAL (UG/KG)	POLYCHLORINATED NAPHTHALENES (UG/L)	TOTAL ALDRIN (UG/L)	ALDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL CHLORDANE (UG/L)	CHLORDANE IN BOTTOM MATERIAL (UG/KG)	TOTAL DDD (UG/L)
OCT										
20...	.10	.00	.0	0	.00	.00	.0	.0	0	.00
MAY										
11...	--	.00	--	--	--	--	--	--	--	--

DATE	DDD IN BOTTOM MATERIAL (UG/KG)	TOTAL DDE (UG/L)	DDE IN BOTTOM MATERIAL (UG/KG)	TOTAL DDT (UG/L)	DDT IN BOTTOM MATERIAL (UG/KG)	TOTAL DIELDRIN (UG/L)	DIELDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ENDRIN (UG/L)	ENDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR (UG/L)
OCT										
20...	.0	.00	.0	.00	.0	.00	.0	.00	.0	.00
MAY										
11...	--	--	--	--	--	--	--	--	--	--

DATE	HEPTACHLOR IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR EPOXIDE (UG/L)	HEPTACHLOR EPOXIDE IN BOTTOM MATERIAL (UG/KG)	TOTAL LINDANE (UG/L)	LINDANE IN BOTTOM MATERIAL (UG/KG)	TOTAL TOXAPHENE (UG/L)	TOXAPHENE IN BOTTOM MATERIAL (UG/KG)	2,4-D IN BOTTOM MATERIAL (UG/KG)	2,4,5-T IN BOTTOM MATERIAL (UG/KG)	SILVEX IN BOTTOM MATERIAL (UG/KG)
OCT										
20...	.0	.00	.0	.00	.0	0	0	0	0	0
MAY										
11...	--	--	--	--	--	--	--	--	--	--

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	---	---	2.0	2.0	1.5	1.5			---	---	---	---
2	---	---	2.0	2.0	1.5	1.5			---	---	---	---
3	---	---	2.0	2.0	1.5	1.5			---	---	---	---
4	---	---	2.0	2.0	1.5	1.5			---	---	---	---
5	---	---	2.0	2.0	1.5	1.5			---	---	---	---
6	---	---	2.0	1.5	1.5	1.0			---	---	---	---
7	---	---	1.5	1.5	1.5	1.5			---	---	---	---
8	---	---	1.5	1.5	1.5	1.5			---	---	0.5	0.5
9	---	---	1.5	1.5	1.5	1.5			0.0	0.0	0.5	0.5
10	---	---	1.5	1.5	1.5	1.0			0.0	0.0	0.5	0.5
11	---	---	1.5	1.5	1.5	1.0			0.0	0.0	0.5	0.5
12	---	---	1.5	1.5	1.5	1.0			0.0	0.0	0.5	0.5
13	---	---	1.5	1.5	1.5	1.0			0.0	0.0	1.0	0.5
14	---	---	1.5	1.0	1.0	1.0			0.5	0.0	1.0	1.0
15	---	---	1.0	1.0	1.0	1.0			1.0	0.5	1.0	1.0
16	---	---	1.0	1.0	1.0	1.0			---	1.0	1.0	1.0
17	---	---	1.0	1.0	1.0	1.0			---	---	1.0	1.0
18	---	---	1.0	1.0	1.0	1.0			---	---	1.0	1.0
19	---	---	1.0	1.0	1.0	1.0			---	---	1.0	1.0
20	2.5	2.5	1.0	1.0	1.5	1.0			---	---	1.0	1.0
21	2.5	2.5	1.0	1.0	1.5	1.5			---	---	1.0	1.0
22	3.0	2.5	1.0	1.0	1.5	1.5			---	---	1.0	1.0
23	2.5	2.5	1.0	1.0	1.5	1.5			---	---	1.5	1.0
24	2.5	2.5	1.0	1.0	1.5	1.0			---	---	2.0	1.5
25	2.5	2.0	1.0	1.0	1.0	1.0			---	---	2.0	1.5
26	2.[illegible]	2.0	1.0	1.0	1.0	1.0			---	---	1.5	1.5
27	2.0	1.5	1.0	1.0	---	---			---	---	1.5	1.5
28	2.0	1.5	1.5	1.0	---	---			---	---	1.5	1.5
29	3.0	2.0	1.5	1.5	---	---			---	---	1.5	1.5
30	3.0	2.5	1.5	1.5	---	---			---	---	1.5	1.5
31	2.5	2.0	---	---	---	---			---	---	1.5	1.5
MONTH	3.0	1.5	2.0	1.0	1.5	1.0			1.0	0.0	2.0	0.5

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	1.5	1.5	11.5	9.0	15.0	13.0	15.5	14.5	16.0	14.5	---	---
2	1.5	1.5	11.0	8.5	14.0	11.0	16.0	13.0	15.5	13.5	---	---
3	1.5	1.5	11.0	8.5	15.0	11.5	16.0	15.0	16.0	13.5	---	---
4	2.0	1.5	10.5	8.5	17.5	14.0	16.5	15.5	16.5	14.5	---	---
5	2.0	2.0	10.5	10.0	16.5	14.0	17.0	15.5	18.5	16.0	---	---
6	2.0	2.0	10.5	9.5	14.0	13.0	16.5	16.0	18.0	15.0	---	---
7	2.5	2.0	10.0	8.0	13.0	12.0	18.0	16.5	18.0	16.0	---	---
8	2.5	2.0	11.0	8.5	13.5	11.0	18.5	17.0	19.0	16.5	---	---
9	2.0	2.0	11.0	8.0	13.5	11.0	18.0	16.5	18.0	15.5	---	---
10	2.0	1.5	10.5	8.5	13.5	12.0	17.5	14.5	16.5	14.5	---	---
11	2.0	2.0	12.5	8.5	15.5	13.0	17.0	15.5	16.5	14.5	---	---
12	2.0	2.0	14.5	11.5	16.0	13.5	17.0	16.0	16.0	15.0	---	---
13	2.5	2.0	16.0	12.5	15.0	12.0	18.5	16.5	18.0	15.0	---	---
14	3.0	2.5	16.0	13.0	15.0	13.0	19.0	18.0	16.0	13.5	---	---
15	3.5	3.0	15.5	13.0	14.5	13.5	20.0	18.0	14.5	13.5	---	---
16	5.0	3.5	18.0	13.5	13.5	13.0	19.0	17.0	14.5	13.5	---	---
17	5.0	5.0	17.5	14.5	16.0	12.5	19.0	16.5	14.5	13.5	---	---
18	5.5	5.0	19.0	15.0	16.0	14.5	20.0	17.5	14.5	13.0	---	---
19	5.5	5.5	18.5	16.0	14.5	13.5	21.5	19.0	14.5	12.5	---	---
20	5.5	5.5	17.5	15.0	16.5	14.0	22.0	21.0	14.0	12.0	---	---
21	6.0	5.5	17.5	14.0	17.0	13.5	21.0	18.5	15.0	12.5	---	---
22	6.5	5.5	18.0	15.0	17.0	14.0	19.5	17.0	14.0	12.0	10.5	10.0
23	7.5	6.5	17.5	15.5	17.0	15.0	19.5	17.5	15.0	12.5	11.0	10.5
24	7.5	6.5	17.0	13.5	16.5	14.5	20.0	18.5	13.0	11.0	11.0	10.5
25	8.0	6.0	17.5	14.5	18.0	14.5	19.0	16.0	---	---	11.0	10.5
26	9.0	7.0	18.0	14.5	17.5	15.0	18.0	15.5	---	---	11.0	11.0
27	8.5	7.5	19.0	16.0	18.0	16.5	17.5	16.0	---	---	11.5	11.0
28	8.0	6.5	19.5	16.0	18.0	16.5	17.5	17.0	---	---	12.0	11.5
29	8.0	6.0	18.0	15.5	18.5	15.5	17.0	16.5	---	---	12.0	12.0
30	10.0	7.5	16.5	14.5	17.5	15.5	16.5	14.5	---	---	12.0	11.0
31	---	---	16.0	14.5	---	---	16.0	15.0	---	---	---	---
MONTH	10.0	1.5	19.5	8.0	18.5	11.0	22.0	13.0	19.0	11.0	12.0	10.0

04031000 BLACK RIVER NEAR BESSEMER, MI

LOCATION.--Lat 46°30'41", long 90°04'28", in NE¼ SE¼ sec.32, T.48 N., R.46 W., Gogebic County, Hydrologic Unit 04020101, on right bank 450 ft (137 m) downstream from bridge on county highway, 500 ft (152 m) downstream from Powder Mill Creek, and 2.5 mi (4.0 km) northwest of Bessemer.

DRAINAGE AREA.--200 mi² (518 km²).

PERIOD OF RECORD.--October 1954 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,154.3 ft (351.83 m) above mean sea level (levels by registered surveyor).

REMARKS.--Records good except those for the winter period, which are fair. Prior to 1967, some ground water pumped from mines at Bessemer. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 234 ft³/s (6.627 m³/s), 15.89 in/yr (404 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,800 ft³/s (419 m³/s) Apr. 24, 1960, gage height, 14.27 ft (4.349 m), from flood-mark, from rating curve extended above 5,300 ft³/s (150 m³/s) on basis of slope-area measurement of peak flow; minimum daily, 6.8 ft³/s (0.19 m³/s) Sept. 25, Oct. 1-3, 1976; minimum gage height, 0.36 ft (0.110 m) Sept. 9, 1970.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,500 ft³/s (42.5 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 29	1700	*2,220	62.9	*6.12	1.865	Apr. 12	0100	2,020	57.2	5.78	1.762

Minimum daily discharge, 6.8 ft³/s (0.19 m³/s) Oct. 1-3; minimum gage height observed, 0.42 ft (0.128 m) Oct. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.8	18	12	12	13	16	1300	189	33	117	26	776
2	6.8	17	12	12	14	16	1070	157	42	91	23	539
3	6.8	19	11	12	14	16	860	138	35	113	23	398
4	7.5	20	12	12	14	16	741	124	33	119	24	836
5	8.0	19	12	12	14	17	595	124	33	126	23	963
6	9.2	17	13	12	14	17	522	126	31	98	19	1050
7	9.6	17	13	12	14	18	452	101	30	75	18	989
8	12	15	13	12	15	19	368	85	29	58	17	718
9	12	16	13	12	16	22	400	76	26	45	16	683
10	12	16	13	12	17	30	810	67	26	38	16	573
11	12	16	14	11	18	60	1660	64	25	34	15	479
12	16	16	14	11	19	120	1880	57	24	32	15	647
13	15	16	14	11	17	200	1670	51	21	29	22	499
14	14	16	14	11	16	350	1370	50	21	27	19	370
15	15	16	14	11	14	390	1110	47	20	27	17	289
16	17	16	14	11	14	380	954	45	20	24	31	232
17	18	16	14	11	14	360	815	43	21	26	27	195
18	17	16	14	12	14	330	722	55	27	27	21	171
19	21	15	14	12	14	300	712	50	24	23	20	356
20	20	15	14	12	14	260	676	45	29	22	17	327
21	21	15	14	12	14	230	819	42	24	21	21	272
22	21	15	14	12	14	200	872	41	21	18	20	276
23	20	15	14	12	14	190	703	38	20	17	17	469
24	19	15	14	13	15	180	583	35	23	17	15	624
25	19	15	14	13	15	180	558	33	27	16	13	811
26	19	15	14	13	15	280	463	32	22	16	13	741
27	18	15	13	13	16	1080	381	28	33	16	56	642
28	18	14	13	13	16	1400	311	26	118	19	96	579
29	21	13	13	13	---	1990	258	25	74	19	72	581
30	20	12	13	13	---	1860	223	24	74	18	57	503
31	19	---	12	13	---	1590	---	26	---	33	777	---
TOTAL	470.7	476	412	373	418	12117	23858	2044	986	1361	1566	16584
MEAN	15.2	15.9	13.3	12.0	14.9	391	795	65.9	32.9	43.9	50.5	553
MAX	21	20	14	13	19	1990	1880	189	118	126	777	1050
MIN	6.8	12	11	11	13	16	223	24	20	16	13	171
CFSM	.08	.08	.07	.06	.08	1.96	3.98	.33	.17	.22	.25	2.77
IN.	.09	.09	.08	.07	.08	2.25	4.44	.38	.18	.25	.29	3.08

CAL YR 1976 TOTAL 75885.7 MEAN 207 MAX 3170 MIN 6.8 CFSM 1.04 IN 14.11
WTR YR 1977 TOTAL 60665.7 MEAN 166 MAX 1990 MIN 6.8 CFSM .83 IN 11.28

04031500 PRESQUE ISLE RIVER AT MARENISCO, MI

LOCATION.--Lat 46°22'20", long 89°41'32", in SE¼ NW¼ sec.21, T.46 N., R.43 W., Gogebic County, Hydrologic Unit 04020101, on left bank 0.3 mi (0.5 km) upstream from highway bridge in Marenisco, and 1.5 mi (2.4 km) downstream from confluence of East and West Branches.

DRAINAGE AREA.--171 mi² (443 km²).

PERIOD OF RECORD.--February 1945 to current year.

REVISED RECORDS.--WSP 1707: 1954. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,489.30 ft (453.939 m) above mean sea level (levels by Michigan Department of Natural Resources). Prior to May 27, 1949, nonrecording gage at site 0.3 mi (0.5 km) downstream at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation for lake or pond level control at several locations in the headwaters. Since 1959, occasional regulation by Presque Isle Flooding Reservoir, usable capacity, about 3,000 acre-ft (3.7 hm³), 2.5 mi (4.0 km) upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 176 ft³/s (4.984 m³/s), 13.98 in/yr (355 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,520 ft³/s (99.7 m³/s) Apr. 25, 1960, gage height, 11.25 ft (3.429 m); minimum observed, 13 ft³/s (0.37 m³/s) Sept. 30, 1948, gage height, 2.25 ft (0.686 m), site and datum then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 589 ft³/s (16.7 m³/s) Sept. 1, gage height, 6.23 ft (1.899 m); minimum, 21 ft³/s (0.59 m³/s) Oct. 3, 4, gage height, 3.12 ft (0.951 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	22	29	30	38	40	43	419	164	91	134	51	566
2	22	29	29	38	40	43	370	137	104	112	45	537
3	22	30	30	38	40	43	319	116	88	135	53	381
4	22	30	32	38	40	43	297	116	94	155	75	430
5	25	27	35	38	40	43	273	124	81	149	66	473
6	25	30	37	37	41	43	262	118	74	134	57	485
7	24	29	38	37	41	44	234	111	68	103	47	524
8	24	28	38	37	42	44	218	103	62	77	38	478
9	25	28	39	38	43	46	198	97	60	66	33	399
10	25	28	39	38	45	48	218	95	56	58	32	336
11	26	28	39	38	45	52	272	95	49	53	31	291
12	27	28	39	38	44	60	341	93	44	48	28	287
13	26	28	40	37	43	100	458	87	41	40	35	252
14	25	29	40	37	42	200	490	90	38	38	36	227
15	25	29	40	37	41	210	439	87	37	50	33	202
16	26	29	40	37	40	200	414	82	37	47	47	182
17	29	30	41	37	40	190	434	75	39	49	50	170
18	28	30	41	37	39	180	431	73	45	46	44	161
19	28	30	41	38	39	170	417	73	45	41	37	235
20	28	30	42	38	38	150	390	71	43	37	34	287
21	29	31	42	38	39	130	394	69	46	35	34	259
22	29	31	42	38	39	120	454	72	39	32	33	245
23	29	32	41	39	40	110	456	71	38	31	29	294
24	28	32	41	39	40	100	385	61	40	28	27	348
25	29	32	41	40	41	110	338	61	41	26	25	434
26	28	33	40	40	41	137	302	76	38	25	25	434
27	28	33	40	40	42	231	253	71	41	25	100	426
28	29	32	40	40	42	310	201	63	124	27	167	380
29	31	32	40	40	---	406	191	57	102	28	137	333
30	32	31	39	40	---	480	183	55	103	27	109	295
31	31	---	39	40	---	472	---	60	---	52	381	---
TOTAL	827	898	1195	1185	1147	4558	10051	2723	1808	1908	1939	10351
MEAN	26.7	29.9	38.5	38.2	41.0	147	335	87.8	60.3	61.5	62.5	345
MAX	32	33	42	40	45	480	490	164	124	155	381	566
MIN	22	27	29	37	38	43	183	55	37	25	25	161
CFSM	.16	.18	.23	.22	.24	.86	1.96	.51	.35	.36	.37	2.02
IN.	.18	.20	.26	.26	.25	.99	2.19	.59	.39	.42	.42	2.25

CAL YR 1976 TOTAL 53329 MEAN 146 MAX 1120 MIN 18 CFSM .85 IN 11.60
WTR YR 1977 TOTAL 38590 MEAN 106 MAX 566 MIN 22 CFSM .62 IN 8.39

04033000 MIDDLE BRANCH ONTONAGON RIVER NEAR PAULDING, MI

LOCATION.--Lat 46°21'29", long 89°04'38", in SE¼ NE¼ sec.29, T.46 N., R.38 W., Ontonagon County, Hydrologic Unit 0402102, Ottawa National Forest, on right bank 25 ft (8 m) downstream from bridge on Forest Service Road 172, 2.4 mi (3.9 km) upstream from Bond Falls Reservoir, and 5.7 mi (9.2 km) southeast of Paulding.

DRAINAGE AREA.--164 mi² (425 km²).

PERIOD OF RECORD.--June 1942 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,485.66 ft (452.829 m) above mean sea level (levels by Michigan Department of Natural Resources). Prior to Sept. 28, 1942, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, and those for period of no gage-height record, Nov. 14 to Dec. 21, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 172 ft³/s (4.871 m³/s), 14.24 in/yr (362 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,050 ft³/s (58.1 m³/s) Apr. 30, 1951, gage height, 10.0 ft (3.048 m), from high-water mark; minimum, 27 ft³/s (0.76 m³/s) Nov. 22, 1946, result of freezeup; minimum gage height, 2.96 ft (0.902 m) Nov. 26, 1942, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 368 ft³/s (10.4 m³/s) Apr. 22, gage height, 5.28 ft (1.609 m); maximum gage height, 6.63 ft (2.021 m) Mar. 13, backwater from ice; minimum daily discharge, 74 ft³/s (2.10 m³/s) July 21-26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	91	110	110	85	90	96	255	162	112	111	96	249
2	90	110	110	85	90	96	232	155	121	107	96	245
3	89	110	110	85	90	96	209	147	111	109	97	211
4	89	110	105	85	90	96	194	139	106	122	104	232
5	94	110	105	85	90	96	184	141	107	132	105	259
6	92	110	105	84	90	98	180	144	107	125	100	257
7	93	100	100	84	90	100	175	134	103	112	95	269
8	96	95	100	84	90	105	150	127	99	104	92	252
9	93	100	98	84	90	110	157	122	96	95	90	235
10	94	105	96	84	90	115	179	117	94	92	90	213
11	93	105	96	84	90	130	242	115	94	88	90	198
12	94	105	94	84	90	180	289	112	91	85	88	230
13	95	100	94	84	92	300	326	110	88	82	90	225
14	95	100	92	84	92	290	340	107	86	82	89	206
15	97	100	92	84	94	250	314	108	85	95	90	186
16	98	105	90	84	94	231	295	108	89	95	95	169
17	99	110	90	84	94	185	287	105	96	90	103	162
18	99	110	90	84	94	174	292	102	95	85	96	157
19	100	110	88	84	94	156	310	100	93	80	91	186
20	100	110	88	84	96	150	312	100	95	75	90	227
21	105	105	88	84	98	140	326	108	93	74	91	223
22	105	105	86	85	98	134	358	106	87	74	91	220
23	105	105	86	85	98	135	320	104	87	74	89	237
24	105	110	86	85	98	127	277	98	88	74	86	244
25	110	115	86	86	96	125	253	100	93	74	85	266
26	110	115	86	88	96	130	227	102	91	74	85	269
27	105	115	86	90	96	188	205	97	92	75	103	257
28	105	115	86	90	96	230	188	91	105	76	132	247
29	110	115	86	90	---	297	175	90	110	80	131	242
30	110	115	86	90	---	321	167	93	105	81	112	227
31	115	---	86	90	---	294	---	94	---	91	175	---
TOTAL	3076	3230	2901	2648	2606	5175	7418	3538	2919	2813	3067	6800
MEAN	99.2	108	93.6	85.4	93.1	167	247	114	97.3	90.7	98.9	227
MAX	115	115	110	90	98	321	358	162	121	132	175	269
MIN	89	95	86	84	90	96	150	90	85	74	85	157
CFSM	.61	.66	.57	.52	.57	1.02	1.51	.70	.59	.55	.60	1.38
IN.	.70	.73	.66	.60	.59	1.17	1.68	.80	.66	.64	.70	1.54

CAL YR 1976 TOTAL 56655 MEAN 155 MAX 940 MIN 79 CFSM .95 IN 12.85
WTR YR 1977 TOTAL 46191 MEAN 127 MAX 358 MIN 74 CFSM .77 IN 10.48

04033500 BOND FALLS CANAL NEAR PAULDING, MI

LOCATION.--Lat 46°23'57", long 89°08'47", in SW¼ NE¼ sec.11, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 40 ft (12 m) upstream from intake to pipeline No. 2, 0.8 mi (1.3 km) downstream from Bond Falls Reservoir on Middle Branch Ontonagon River, and 1.6 mi (2.6 km) east of Paulding.

PERIOD OF RECORD.--July 1942 to current year.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,441.59 ft (439.397 m) above mean sea level. Prior to Oct. 1, 1968, nonrecording gage at datum 3.00 ft (0.914 m) higher.

REMARKS.--Records good except those for period of no gage-height record, Dec. 21 to May 3, which are fair, and those below 10 ft³/s (0.28 m³/s), which are poor. Canal diverts water from Bond Falls Reservoir (see station 04034000) to South Branch Ontonagon River; water is used for power production at Victoria Dam near Rockland. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 137 ft³/s (3.880 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 373 ft³/s (10.6 m³/s) Sept. 23, 1960, gage height, 6.17 ft (1.881 m); no flow at times each year since 1961; minimum gage height observed, -0.03 ft (-0.009 m) Apr. 17, 1963, present datum (two drain holes in weir open and canal gate closed).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	54	53	53	117	163	137	11	.80	3.8	3.4	127	17
2	54	53	63	120	80	137	11	.80	3.8	3.3	66	17
3	54	53	72	121	69	137	11	1.5	3.8	3.5	17	17
4	54	53	72	121	69	137	11	1.7	4.1	3.4	16	19
5	54	53	72	120	69	136	11	2.7	4.1	3.5	16	18
6	54	53	72	120	69	136	11	3.2	3.8	3.4	16	18
7	53	53	71	120	69	136	11	1.5	3.8	3.4	16	18
8	54	53	87	119	69	134	11	1.7	4.1	3.5	16	18
9	53	53	102	116	115	173	11	1.7	4.1	3.4	16	18
10	53	53	102	119	115	172	11	1.9	4.5	3.7	16	18
11	54	53	102	153	114	171	11	3.5	4.5	3.9	15	19
12	53	53	102	153	114	78	10	3.9	5.2	22	15	18
13	53	53	114	150	114	11	10	4.4	5.6	54	15	18
14	53	53	125	146	114	11	9.4	4.8	5.4	88	15	18
15	53	53	127	143	114	11	9.4	1.2	3.3	104	15	19
16	53	53	127	141	113	11	9.4	2.4	3.6	103	15	19
17	53	53	126	140	113	11	7.0	1.8	3.5	104	15	19
18	53	53	126	143	146	11	5.2	4.6	3.8	119	15	19
19	53	53	126	143	145	11	5.2	4.2	3.9	132	15	19
20	53	54	123	142	142	11	4.5	3.8	4.2	131	15	19
21	53	54	120	170	140	11	3.8	3.6	4.1	131	15	19
22	53	53	120	168	140	11	1.2	3.5	4.1	130	15	20
23	53	52	120	170	140	11	.90	3.4	4.3	130	15	20
24	53	53	120	171	139	11	.80	3.2	4.8	130	15	20
25	53	53	120	167	138	11	.80	3.2	4.1	129	15	32
26	53	54	120	166	138	10	.80	3.5	4.3	128	15	46
27	53	54	116	166	138	11	.80	3.8	4.9	128	15	46
28	53	54	113	164	138	11	.80	4.3	4.2	129	15	46
29	53	53	111	161	---	11	.80	4.8	3.1	128	109	47
30	53	53	114	164	---	11	.80	1.2	3.5	128	89	94
31	53	---	114	167	---	11	---	2.7	---	127	19	---
TOTAL	1651	1594	3252	4481	3227	1892	202.60	89.30	124.3	2313.4	809	755
MEAN	53.3	53.1	105	145	115	61.0	6.75	2.88	4.14	74.6	26.1	25.2
MAX	54	54	127	171	163	173	11	4.8	5.6	132	127	94
MIN	53	52	53	116	69	10	.80	.80	3.1	3.3	15	17

CAL YR 1976 TOTAL 53110.70 MEAN 145 MAX 304 MIN 1.3
WTR YR 1977 TOTAL 20390.60 MEAN 55.9 MAX 173 MIN .80

04034000 BOND FALLS RESERVOIR NEAR PAULDING, MI

LOCATION.--Lat 46°24'29", long 89°07'42", in SW¼ sec.1, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, at Bond Falls Dam on Middle Branch Ontonagon River, 2.5 mi (4.0 km) east of Paulding.

DRAINAGE AREA.--190 mi² (492 km²).

PERIOD OF RECORD.--June 1942 to current year. Prior to October 1950, monthend contents only published in WSP 1307.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Nonrecording gage read once daily. Datum of gage is 1,335.59 ft (407.088 m) above mean sea level.

REMARKS.--Reservoir is formed by earthfill and concrete dam with one taintor gate; dam completed 1937. Usable capacity, 39,720 acre-ft (49.0 hm³) between gage heights of 120 ft (36.6 m) (maximum drawdown) and 141 ft (43.0 m) (full pond). Dead storage unknown. Water diverted to South Branch Ontonagon River through Bond Falls Canal (see station 04033500); water used for power production at Victoria Dam near Rockland.

COOPERATION.--Gage-height record furnished by Upper Peninsula Power Co. and converted to acre-feet by Geological Survey.

EXTREMES FOR PERIOD OF RECORD (SINCE 1947).--Maximum contents observed, 42,980 acre-ft (53.0 hm³) July 3, 1953, gage height, 141.7 ft (43.19 m), of which 1,680 acre-ft (2.07 hm³) was uncontrolled storage; minimum, no usable storage at times; minimum gage height observed, 116.0 ft (35.36 m) Mar. 21, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 38,900 acre-ft (48.0 hm³) Sept. 30, gage height, 140.0 ft (42.67 m); no usable storage Mar. 11, 12; minimum gage height observed, 119.9 ft (36.55 m) Mar. 11.

MONTHEND GAGE HEIGHT AND CONTENTS AT 0930, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in ft³/s)
Sept. 30	126.1	10190	--	--
Oct. 31	126.4	10760	+570	+9.3
Nov. 30	127.0	11900	+1140	+19.2
Dec. 31	125.5	9100	-2800	-45.5
CAL YR 1976	--	--	-18940	-26.1
Jan. 31	122.4	3640	-5460	-88.8
Feb. 28	120.9	1350	-2290	-41.2
Mar. 31	124.7	7660	+6310	+103
Apr. 30	132.3	22100	+14440	+243
May 31	134.3	26130	+4030	+65.5
June 30	135.6	28920	+2790	+46.9
July 31	134.4	26340	-2580	-42.0
Aug. 31	135.2	28040	+1700	+27.6
Sept. 30	140.0	38900	+10860	+183
WTR YR 1977	--	--	+28710	+39.7

04034500 MIDDLE BRANCH ONTONAGON RIVER NEAR TROUT CREEK, MI

LOCATION.--lat 46°28'40", long 89°05'25", in SW¼ sec.8, T.47 N., R.38 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 0.1 mi (0.2 km) upstream from State Highway 28, 3.8 mi (6.1 km) west of village of Trout Creek, and 7.5 mi (12.1 km) downstream from Bond Falls Reservoir.

DRAINAGE AREA.--203 mi² (526 km²).

PERIOD OF RECORD.--June 1942 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,132.03 ft (345.043 m) above mean sea level (levels by Michigan Department of Natural Resources). Prior to November 4, 1942, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by Bond Falls Reservoir 7.5 mi (12.1 km) upstream (see station 04034000). Diversion to South Branch Ontonagon River 8.5 mi (13.7 km) above station by Bond Falls Canal (see station 04033500). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 69.1 ft³/s (1.957 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,750 ft³/s (49.6 m³/s) Nov. 7, 1951, gage height, 5.05 ft (1.539 m); minimum, 14 ft³/s (0.40 m³/s) sometime during period Jan. 23 to Feb. 13, 1947, gage height, 1.14 ft (0.347 m), from recorded range in stage, caused by ice jams upstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 146 ft³/s (4.13 m³/s) Aug. 31, gage height, 2.14 ft (0.652 m); minimum, 27 ft³/s (0.76 m³/s) Mar. 24, gage height, 1.43 ft (0.436 m), result of freezeup; minimum daily, 41 ft³/s (1.16 m³/s) Dec. 21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	44	45	45	45	45	47	54	46	58	58	57	69
2	44	45	45	45	46	48	53	46	56	56	57	58
3	44	46	45	45	45	48	50	46	55	59	58	48
4	44	46	45	45	45	47	49	46	56	57	57	89
5	45	45	45	45	44	46	48	48	55	72	57	62
6	45	45	45	45	44	45	49	46	56	59	57	57
7	45	45	45	45	44	44	47	46	55	57	57	54
8	45	43	45	45	44	46	47	46	55	56	56	50
9	45	46	45	45	44	48	47	46	55	55	57	53
10	45	45	45	45	44	49	54	45	55	55	57	49
11	45	45	45	45	44	50	65	45	55	55	57	50
12	44	45	45	45	44	56	60	45	55	56	57	57
13	45	45	45	45	44	64	67	45	55	56	61	51
14	45	44	45	45	44	62	57	45	55	58	57	48
15	46	43	45	45	44	59	59	45	55	58	57	47
16	46	45	45	45	44	55	55	45	57	57	61	49
17	45	45	45	45	44	50	55	45	55	57	58	48
18	45	45	45	45	44	50	55	45	56	56	57	49
19	45	45	45	45	44	46	53	45	55	56	57	56
20	45	45	43	45	44	48	49	45	57	56	57	52
21	47	45	41	45	44	48	55	46	55	55	57	49
22	46	44	43	45	44	47	53	45	55	55	57	52
23	45	45	44	45	44	49	50	45	55	55	57	54
24	45	43	44	45	44	47	50	45	57	56	57	53
25	45	45	45	46	45	47	48	45	56	55	57	54
26	45	45	45	45	46	49	48	45	54	55	57	52
27	45	45	44	45	46	60	46	45	57	55	67	72
28	45	42	45	45	45	60	46	45	59	58	59	120
29	46	45	45	45	---	77	46	45	55	57	58	116
30	46	45	45	45	---	66	46	46	59	56	58	91
31	46	---	45	45	---	58	---	46	---	59	113	---
TOTAL	1398	1342	1384	1396	1243	1616	1561	1409	1673	1765	1846	1809
MEAN	45.1	44.7	44.6	45.0	44.4	52.1	52.0	45.5	55.8	56.9	59.5	60.3
MAX	47	46	45	46	46	77	67	48	59	72	113	120
MIN	44	42	41	45	44	44	46	45	54	55	56	47

CAL YR 1976 TOTAL 18118 MEAN 49.5 MAX 129 MIN 41
WTR YR 1977 TOTAL 18442 MEAN 50.5 MAX 120 MIN 41

04035000 EAST BRANCH ONTONAGON RIVER NEAR MASS, MI

LOCATION.--Lat 46°41'24", long 89°04'24", in SW¼ NW¼ sec.33, T.50 N., R.38 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 700 ft (213 m) downstream from abandoned highway bridge, 1,000 ft (305 m) downstream from Adventure Creek, 5.0 mi (8.0 km) south of Mass, and 7.5 mi (12.1 km) upstream from mouth.

DRAINAGE AREA.--272 mi² (704 km²).

PERIOD OF RECORD.--July 1942 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 873.55 ft (266.258 m) above mean sea level (levels by Michigan Department of Natural Resources). Prior to October 1, 1949, nonrecording gage at site 700 ft (213 m) upstream at same datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 258 ft³/s (7.307 m³/s), 12.88 in/yr (327 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,590 ft³/s (130 m³/s) July 1, 1953, gage height, 10.57 ft (3.222 m); maximum gage height, 10.65 ft (3.246 m) Apr. 24, 1960; minimum discharge, 60 ft³/s (1.70 m³/s) Aug. 25, 1948, gage height, 3.55 ft (1.082 m), site then in use; minimum gage height, 3.28 ft (1.000 m) Sept. 13, 1976.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,400 ft³/s (40 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 29	1700	*2,000	56.6	*7.71	2.350	Apr. 11	2100	1,680	47.6	7.25	2.210

Minimum discharge, 80 ft³/s (2.27 m³/s) July 27, 28, gage height, 3.24 ft (0.988 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	99	127	130	105	120	135	712	173	154	208	106	448
2	98	124	125	105	120	135	557	160	193	187	101	338
3	97	130	125	105	120	140	468	152	169	238	101	252
4	97	132	125	105	120	145	414	146	153	237	105	413
5	102	128	120	105	120	150	329	157	144	252	107	713
6	102	124	120	105	120	150	254	174	141	242	101	461
7	102	120	120	105	120	155	309	160	137	183	97	384
8	101	117	115	100	120	155	232	147	133	141	93	299
9	101	123	115	100	120	160	261	138	129	120	90	257
10	102	142	115	100	125	165	649	134	121	106	93	248
11	103	120	110	100	125	190	1320	133	118	101	99	193
12	103	123	110	100	125	300	1240	132	115	98	95	175
13	103	121	110	100	125	550	1230	129	111	95	108	191
14	102	108	110	100	125	800	1010	124	107	96	112	171
15	109	103	105	100	125	960	1080	124	105	118	104	148
16	119	112	105	100	130	700	1070	125	107	120	113	138
17	121	137	105	100	130	550	740	124	116	116	124	134
18	116	145	105	100	130	450	677	125	121	106	116	133
19	113	130	105	100	130	400	645	130	118	99	107	143
20	112	125	105	100	130	350	526	129	118	95	100	203
21	119	123	105	100	130	310	580	141	114	92	102	196
22	128	113	105	100	130	280	680	144	102	88	98	174
23	131	123	105	100	130	275	485	139	97	86	96	209
24	125	121	105	100	130	274	379	131	97	85	95	253
25	124	127	105	105	135	271	336	126	97	85	92	325
26	122	143	105	105	135	302	291	123	94	83	91	291
27	124	145	105	110	135	783	250	122	114	81	119	256
28	118	126	105	110	135	1000	219	123	215	88	148	305
29	123	129	105	115	---	1630	195	121	153	99	133	324
30	137	130	105	120	---	1430	184	128	151	98	117	313
31	135	---	105	120	---	988	---	140	---	105	273	---
TOTAL	3488	3771	3435	3220	3540	14283	17342	4254	3844	3948	3436	8888
MEAN	113	126	111	104	126	461	578	137	128	127	111	270
MAX	137	145	130	120	135	1630	1320	174	215	252	273	713
MIN	97	103	105	100	120	135	184	121	94	81	90	133
CFSM	.42	.46	.41	.38	.46	1.70	2.13	.50	.47	.47	.41	.99
IN.	.48	.52	.47	.44	.48	1.95	2.37	.58	.53	.54	.47	1.11

CAL YR 1976 TOTAL 80623 MEAN 220 MAX 1900 MIN 87 CFSM .81 IN 11.03
WTR YR 1977 TOTAL 72649 MEAN 199 MAX 1630 MIN 81 CFSM .73 IN 9.94

04035500 MIDDLE BRANCH ONTONAGON RIVER NEAR ROCKLAND, MI

LOCATION.--lat 46°41'57", long 89°09'36", in SE¼ sec.27, T.50 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 10 ft (3 m) upstream from bridge on U.S. Highway 45, 700 ft (213 m) downstream from East Branch, and 2.8 mi (4.5 km) southeast of Rockland.

DRAINAGE AREA.--671 mi² (1,738 km²).

PERIOD OF RECORD.--July 1942 to current year.

GAGE.--Water-stage recorder. Datum of gage is 661.1 ft (201.50 m) above mean sea level. Prior to April 1, 1959, nonrecording gage at site 400 ft (122 m) upstream at same datum. April 1, 1959, to October 21, 1968, nonrecording gage at present site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Regulation by Bond Falls Reservoir 30.0 mi (48.3 km) above station (see sta 04034000). Diversion to South Branch Ontonagon River 31.0 mi (49.9 km) above station by Bond Falls Canal (see sta 04033500). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 526 ft³/s (14.90 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 27,000 ft³/s (765 m³/s) Aug. 22, 1942, gage height, 21.2 ft (6.46 m), from flood-marks, from rating curve extended above 7,500 ft³/s (212 m³/s) on basis of slope-area measurement of peak flow; minimum observed, 142 ft³/s (4.02 m³/s) Dec. 3, 1963, discharge measurement; minimum daily, 145 ft³/s (4.11 m³/s) Dec. 3, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,710 ft³/s (162 m³/s) Mar. 29, gage height, 9.01 ft (2.746 m); minimum, 170 ft³/s (4.81 m³/s) Aug. 24, 25, gage height, 4.28 ft (1.305 m); minimum daily, 175 ft³/s (4.96 m³/s) July 23-27, Aug. 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	185	226	245	205	220	245	1400	314	268	450	213	987
2	190	226	245	205	220	250	1090	291	330	392	201	550
3	187	236	245	205	220	255	997	274	301	470	200	401
4	188	237	245	200	220	255	896	260	279	470	199	1390
5	196	228	240	200	220	260	710	266	271	680	203	1770
6	187	223	240	200	220	265	565	294	270	580	195	860
7	189	215	235	200	220	275	588	287	270	347	191	760
8	191	210	235	200	220	280	445	267	260	272	183	580
9	191	205	235	200	225	285	512	251	251	228	175	500
10	191	210	230	200	225	290	1510	249	264	210	180	500
11	191	215	230	195	225	310	3200	247	264	204	187	365
12	191	220	225	195	230	400	2440	242	264	204	183	329
13	193	210	220	195	230	1000	2440	235	256	198	207	356
14	191	195	220	195	230	2000	1770	229	256	203	214	312
15	203	190	220	195	235	3170	2240	222	248	231	196	264
16	221	215	215	195	235	2980	2000	224	240	233	216	240
17	217	230	215	195	235	1680	1330	222	248	230	224	248
18	209	230	210	195	235	1040	1310	221	264	213	206	264
19	209	225	210	195	235	899	1350	227	264	204	190	288
20	205	220	210	195	235	727	1020	227	264	197	182	410
21	221	220	210	190	230	697	1330	247	256	188	187	392
22	231	225	210	190	230	668	1490	255	248	186	180	338
23	233	225	210	190	230	592	932	246	240	175	180	610
24	223	230	210	195	235	529	710	232	234	175	180	720
25	221	230	210	195	240	488	650	227	228	175	180	998
26	215	235	205	200	240	515	540	222	222	175	180	710
27	219	240	205	205	240	2200	445	216	280	175	225	560
28	212	240	205	210	240	2710	389	215	520	180	276	710
29	221	240	205	215	---	4480	346	215	338	192	231	790
30	239	240	205	215	---	3720	327	220	329	197	205	740
31	237	---	205	220	---	2270	---	239	---	210	797	---
TOTAL	6397	6691	6850	6190	6420	35735	34973	7583	8227	8244	6766	17942
MEAN	206	223	221	200	229	1153	1166	245	274	266	218	598
MAX	239	240	245	220	240	4480	3200	314	520	680	797	1770
MIN	185	190	205	190	220	245	327	215	222	175	175	240

CAL YR 1976 TOTAL 165729 MEAN 453 MAX 4630 MIN 165
WTR YR 1977 TOTAL 152018 MEAN 416 MAX 4480 MIN 175

04036000 WEST BRANCH ONTONAGON RIVER NEAR BERGLAND, MI

LOCATION.--Lat 46°35'15", long 89°32'30", in SW¼ NE¼ sec.3, T.48 N., R.42 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 0.4 mi (0.6 km) downstream from dam at outlet of Gogebic Lake and 1.5 mi (2.4 km) east of Bergland.

DRAINAGE AREA.--162 mi² (420 km²).

PERIOD OF RECORD.--July 1942 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,290.81 ft (393.439 m) above mean sea level. Prior to November 5, 1942, nonrecording gage 0.4 mi (0.6 km) upstream at different datum.

REMARKS.--Records good except those for periods of no gage-height record, Oct. 1 to Nov. 19, Apr. 25 to May 24, and July 17 to Sept. 5, which are poor. Flow regulated by Gogebic Lake, usable capacity, 35,200 acre-ft (43.4 hm³). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 174 ft³/s (4.928 m³/s), 14.59 in/yr (371 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,400 ft³/s (39.6 m³/s) Apr. 26, 1960, gage height, 5.98 ft (1.823 m); minimum daily, 0.70 ft³/s (0.020 m³/s) Sept. 26 to Oct. 19, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 752 ft³/s (21.3 m³/s) Sept. 9, gage height, 4.48 ft (1.366 m); minimum daily, 0.80 ft³/s (0.023 m³/s) Oct. 23 to Nov. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.0	.80	75	82	158	111	286	2.6	71	211	5.8	6.0
2	1.0	.80	73	78	184	114	297	2.6	78	214	5.8	6.5
3	1.0	.80	72	76	182	118	302	2.6	83	234	5.8	6.0
4	1.0	.80	71	73	180	118	313	2.3	77	235	6.0	6.5
5	1.0	.80	71	71	176	116	322	2.6	72	252	6.0	7.5
6	1.0	.80	71	71	172	115	322	2.9	68	239	5.8	95
7	1.0	.80	70	70	168	111	318	2.9	117	236	5.8	357
8	1.0	.80	86	70	164	110	315	2.9	115	224	5.8	512
9	1.0	.80	97	67	163	107	315	2.9	118	203	5.8	638
10	1.0	.80	97	67	163	108	328	2.9	116	201	5.8	527
11	.95	.80	93	89	160	124	359	2.9	91	194	4.7	463
12	.95	.80	100	112	157	130	408	2.9	87	181	4.7	406
13	.95	.80	115	109	155	131	451	2.9	88	160	4.7	405
14	.95	.80	130	108	151	138	479	3.2	83	156	4.7	399
15	.95	.80	121	105	145	138	504	3.5	81	82	4.7	393
16	.95	.90	115	101	140	138	515	4.1	78	29	4.7	254
17	.95	.90	109	97	138	141	528	3.3	79	8.2	4.7	311
18	.95	.90	103	93	135	143	538	3.8	84	7.5	4.7	421
19	.95	.90	98	99	131	142	540	3.8	71	7.0	4.7	313
20	.95	44	98	121	127	141	541	3.8	67	7.0	4.7	226
21	.95	45	99	126	127	142	557	4.1	69	6.0	4.7	242
22	1.0	45	97	120	123	143	150	4.7	66	6.0	4.7	246
23	.80	46	97	115	127	140	49	5.5	66	6.0	4.7	368
24	.80	46	95	113	126	140	22	5.5	61	6.0	4.7	450
25	.80	46	90	110	122	138	12	70	60	6.0	4.7	566
26	.80	48	88	110	120	147	4.6	75	62	5.8	4.7	620
27	.80	50	86	112	118	159	3.3	74	67	5.8	4.7	510
28	.80	50	90	131	115	191	3.3	68	80	5.8	4.7	371
29	.80	50	86	140	---	220	3.3	66	73	5.8	4.7	367
30	.80	57	85	136	---	250	2.7	67	95	5.8	4.7	312
31	.80	---	83	130	---	268	---	69	---	5.8	5.0	---
TOTAL	28.65	542.60	2864	3102	4127	4432	8788.2	570.2	2423	3145.5	157.4	9804.5
MEAN	.92	18.1	92.4	100	147	143	293	18.4	80.8	101	5.08	327
MAX	1.0	57	130	140	184	268	557	75	118	252	6.0	638
MIN	.80	.80	70	67	115	107	2.7	2.3	60	5.8	4.7	6.0

CAL YR 1976 TOTAL 49710.85 MEAN 136 MAX 937 MIN .80 CFSM .84 IN 11.42
WTR YR 1977 TOTAL 39985.05 MEAN 110 MAX 638 MIN .80 CFSM .68 IN 9.18

04037500 CISCO BRANCH ONTONAGON RIVER AT CISCO LAKE OUTLET, MI

LOCATION.--Lat 46°15'12", long 89°27'05", in NE¼ sec.32, T.45 N., R.41 W., Gogebic County, Hydrologic Unit 04020102, on left bank 80 ft (24 m) downstream from Cisco Lake Dam, 2.5 mi (4.0 km) upstream from Langford Creek, 5.0 mi (8.0 km) upstream from U.S. Highway 2, and 13 mi (21 km) west of Watersmeet.

DRAINAGE AREA.--50.7 mi² (131.3 km²).

PERIOD OF RECORD.--October 1944 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,672.69 ft (509.836 m) above mean sea level. Prior to October 1, 1968, nonrecording gage at same site and at datum 4.00 ft (1.219 m) higher.

REMARKS.--Records good except those below 1.0 ft³/s (0.028 m³/s), which are fair. Flow completely regulated by Cisco Lake, usable capacity, 15,600 acre-ft (19.2 hm³). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--33 years, 46.7 ft³/s (1.323 m³/s), 12.51 in/yr (318 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 288 ft³/s (8.16 m³/s) May 1-4, 1951, gage height, 6.10 ft (1.859 m), present datum; minimum daily, 0.09 ft³/s (0.003 m³/s) June 4-23, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 213 ft³/s (6.03 m³/s) Aug. 31, gage height, 5.69 ft (1.734 m); minimum daily, 0.09 ft³/s (0.003 m³/s) June 4-23; minimum gage height observed, 3.81 ft (1.161 m) June 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.28	79	34	29	27	30	85	.18	.10	.23	.22	203
2	.28	90	34	29	27	29	79	.16	.10	.21	.24	196
3	.31	101	33	29	27	29	73	.14	.10	.25	.27	190
4	.34	100	32	29	26	31	73	.12	.09	.25	.26	191
5	.37	104	32	29	27	49	76	.15	.09	.37	.25	188
6	.27	105	32	29	27	61	75	.16	.09	.30	.26	190
7	.29	101	32	29	26	60	74	.17	.09	.31	.27	141
8	.27	100	32	29	24	59	73	.17	.09	.33	.26	110
9	.26	94	32	29	24	58	66	.17	.09	.33	.27	106
10	.26	92	32	29	24	50	66	.17	.09	.38	.26	44
11	.26	93	32	29	25	43	66	.20	.09	.48	.23	4.6
12	.27	91	31	29	24	67	71	.20	.09	.27	.24	4.0
13	.29	89	32	29	23	86	73	.22	.09	.24	.25	4.0
14	.29	87	31	29	23	86	72	.20	.09	.26	.24	23
15	.29	78	30	29	23	85	71	.20	.09	.20	.26	36
16	.29	72	30	29	19	84	63	.20	.09	.21	19	69
17	.29	57	30	29	16	83	49	.20	.09	.21	30	88
18	17	46	30	28	16	83	65	.20	.09	.27	31	88
19	28	37	29	28	16	81	36	.20	.09	.25	31	113
20	35	31	30	28	16	80	.60	.18	.09	.20	30	126
21	41	31	30	28	16	48	.82	.21	.09	.20	30	102
22	50	31	30	28	16	28	.81	.20	.09	.20	28	90
23	58	31	30	28	17	28	.63	.18	.09	.19	13	92
24	56	32	30	28	17	28	.53	.17	.10	.23	.32	104
25	56	32	30	28	16	28	.52	.17	.11	.20	.38	109
26	55	34	30	28	16	28	.45	.17	.15	.20	.38	110
27	54	34	31	28	16	30	.24	.17	.19	.18	56	108
28	69	35	31	28	25	47	.32	.16	.20	.18	95	107
29	84	34	31	28	---	76	.29	.14	.20	.21	106	107
30	80	34	30	28	---	87	.23	.12	.22	.25	112	79
31	79	---	30	27	---	86	---	.11	---	.21	177	---
TOTAL	766.91	1975	963	884	599	1748	1311.44	5.39	3.27	7.80	762.86	3122.6
MEAN	24.7	65.8	31.1	28.5	21.4	56.4	43.7	.17	.11	.25	24.6	104
MAX	84	105	34	29	27	87	85	.22	.22	.48	177	203
MIN	.26	31	29	27	16	28	.23	.11	.09	.18	.22	4.0

CAL YR 1976 TOTAL 11693.52 MEAN 31.9 MAX 110 MIN .19
WTR YR 1977 TOTAL 12149.27 MEAN 33.3 MAX 203 MIN .09

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI

LOCATION.--lat 46°43'15", long 89°12'25", in NE¼ sec.20, T.50 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 50 ft (15 m) downstream from bridge on Victoria Road, 1.8 mi (2.9 km) southwest of Rockland, and 2.4 mi (3.9 km) downstream from confluence of Middle and West Branches.

DRAINAGE AREA.--1,340 mi² (3,470 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1942 to current year.

REVISED RECORDS.--WSP 1387: 1943, 1946-47. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 638.72 ft (194.682 m) above mean sea level. Prior to November 23, 1943, nonrecording gage and November 23, 1943, to October 17, 1967, water-stage recorder at site 50 ft (15 m) upstream at same datum.

REMARKS.--Water-discharge records fair. Considerable regulation by powerplant on West Branch 5 mi (8 km) above station; Bond Falls Reservoir 25 mi (40 km) above station (see station 04034000); Gogebic and Cisco Lakes, combined usable capacity, 50,800 acre-ft (62.6 hm³), in headwaters.

AVERAGE DISCHARGE.--35 years, 1,402 ft³/s (39.70 m³/s), 14.21 in/yr (361 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 42,000 ft³/s (1,190 m³/s) Aug. 22, 1942, gage height, 28.6 ft (8.73 m) from flood-mark, from rating curve extended above 14,000 ft³/s (396 m³/s) on basis of slope-area measurement of peak flow; minimum daily, 192 ft³/s (5.44 m³/s) July 28, 29, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 9,000 ft³/s (255 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 16	0400	9,240	262	12.79	3.898	Mar. 29	2200	*10,700	303	*13.61	4.148

Minimum daily discharge, 218 ft³/s (6.17 m³/s) Aug. 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	296	380	420	470	590	650	4400	710	450	952	414	1900
2	352	404	450	480	650	600	3310	550	750	869	400	1890
3	348	497	470	490	540	650	2690	450	460	700	436	1360
4	302	464	490	480	580	620	2170	476	540	1010	366	1960
5	269	466	480	500	560	680	2010	570	410	1150	404	3380
6	269	452	460	470	540	650	1640	550	640	1030	245	2570
7	251	471	440	540	540	720	1670	408	560	1020	222	2520
8	320	488	460	420	500	700	1440	510	450	934	344	2290
9	334	390	460	480	530	750	1570	442	480	615	218	1950
10	251	414	520	480	550	720	3390	422	470	535	257	1530
11	293	364	500	490	560	850	7310	358	430	394	248	1180
12	355	464	520	450	600	1100	6450	352	390	442	242	1090
13	239	476	480	490	640	1500	6110	414	410	430	442	1760
14	376	366	610	540	580	3500	4820	344	400	400	269	1340
15	305	453	610	560	580	6950	5440	386	420	480	230	1100
16	442	422	580	540	570	8600	4750	366	440	500	281	1090
17	358	390	540	500	560	6690	3500	362	350	400	670	1110
18	251	460	540	520	620	5080	3090	338	440	440	668	887
19	281	432	550	490	640	3820	3380	376	400	400	692	1140
20	314	555	600	520	680	3110	2760	355	410	370	670	1300
21	369	418	420	590	720	2560	3400	358	390	266	660	1470
22	314	480	560	560	640	2170	3640	314	408	372	290	1440
23	510	327	480	580	580	1890	2410	317	293	394	266	1590
24	383	488	540	540	1590	1720	1840	330	317	344	293	2140
25	442	446	480	600	680	1510	1690	338	293	358	290	2890
26	320	472	540	550	720	1460	1350	334	281	348	242	3020
27	414	575	560	520	680	3770	950	330	630	376	422	2330
28	450	239	540	590	700	6480	800	350	1300	344	334	2020
29	355	400	470	510	---	9170	670	360	700	358	442	2030
30	305	420	460	560	---	8530	560	370	428	376	460	2040
31	545	---	470	580	---	6210	---	380	---	320	1280	---
TOTAL	10613	13073	15700	16090	17920	93410	89210	12520	14340	16927	12697	54317
MEAN	342	436	506	519	640	3013	2974	404	478	546	410	1811
MAX	545	575	610	600	1590	9170	7310	710	1300	1150	1280	3380
MIN	239	239	420	420	500	600	560	314	281	266	218	887

CAL YR 1976 TOTAL 432335 MEAN 1181 MAX 9430 MIN 220
WTR YR 1977 TOTAL 366817 MEAN 1005 MAX 9170 MIN 218

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1972 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to current year.
WATER TEMPERATURES: October 1974 to current year.

INSTRUMENTATION.--Water quality monitor since October 1975.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument and sediment deposits on sensors. Monthly samples collected as a cross-section sample at cableway 200 ft (61 m) upstream from bridge on Victoria Road prior to June 1977 and subsequently, at upstream side of new bridge at same site. Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded, 192 micromhos Mar. 26, 1977; minimum (water years 1974-76), 45 micromhos Dec. 2, 1975.
WATER TEMPERATURES: Maximum, 28.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 28.0°C July 19; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UM-MF (COL./ 100 ML)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML)	HARDNESS (CA+MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)
OCT												
12...	1600	530	169	8.0	9.5	10.6	95	430	B2	--	86	0
NOV												
11...	1000	355	145	7.9	.5	14.0	100	190	B3	B9	84	0
DEC												
14...	1530	671	170	7.3	.0	13.2	94	83	B2	8	73	0
JAN												
18...	1530	524	160	7.5	.0	12.5	88	20	B14	9	77	0
FEB												
23...	1045	778	151	7.3	.0	13.2	92	B3	B8	B6	68	0
MAR												
30...	1400	7890	80	6.7	1.5	13.3	99	B350	--	B440	33	7
MAY												
04...	1100	397	140	7.1	11.0	10.0	93	470	B9	B2	71	8
25...	0900	332	165	7.9	19.5	8.3	91	160	97	95	93	8
JUN												
22...	0900	237	168	7.8	14.0	8.5	90	180	23	51	83	0
JUL												
13...	0900	251	165	7.8	21.0	8.4	95	230	B29	B2000	85	6
AUG												
17...	1200	884	167	7.9	14.0	9.2	90	160	B44	B73	85	8
SEP												
21...	1030	1480	105	7.2	12.5	10.0	94	B960	67	169	51	7

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
OCT												
12...	24	6.4	2.4	.1	1.1	108	0	89	1.7	3.1	2.4	.1
NOV												
11...	23	6.4	2.6	.1	1.0	108	0	89	2.2	6.8	2.3	.1
DEC												
14...	20	5.7	2.6	.1	1.0	96	0	79	7.7	6.3	2.7	.1
JAN												
18...	21	6.0	2.5	.1	1.0	98	0	80	5.0	8.3	2.5	.1
FEB												
23...	19	5.0	2.1	.1	.9	86	0	71	6.9	6.2	3.4	.1
MAR												
30...	10	2.0	1.6	.1	1.3	32	0	26	10	7.1	2.3	.1
MAY												
04...	20	5.0	2.6	.1	1.1	76	0	62	9.7	10	5.0	.1
25...	27	6.2	3.1	.1	1.2	104	0	85	2.1	5.4	2.5	.0
JUN												
22...	23	6.2	3.1	.1	1.1	108	0	89	2.7	4.4	2.3	.0
JUL												
13...	24	6.1	3.1	.1	1.2	96	0	79	2.4	5.3	2.3	.1
AUG												
17...	24	6.1	2.6	.1	1.0	94	0	77	1.9	5.5	2.5	.1
SEP												
21...	14	3.8	2.2	.1	1.0	53	0	43	5.4	7.7	2.8	.1

B--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	SUS-PENDED SEDI-MENT (MG/L)	SUS-PENDED SEDI-MENT DIS-CHARGE (T/DAY)	SUS. SED. SIEVE DIAM. % FINER THAN .062 MM
OCT											
12...	9.9	106	103	152	.02	.20	.89	.05	45	64	100
NOV											
11...	12	118	107	113	.08	.26	1.2	.03	18	17	100
DEC											
14...	11	110	97	199	.12	.35	1.6	.04	39	71	100
JAN											
18...	12	100	102	141	.18	.45	2.0	.03	13	18	100
FEB											
23...	11	95	90	200	.17	.57	2.5	.03	12	25	100
MAR											
30...	6.1	--	46	--	.39	1.4	6.2	.16	400	8520	100
MAY											
04...	7.5	115	89	123	.06	1.1	4.7	.04	27	29	100
25...	8.0	101	105	90.5	.01	.38	1.7	.02	24	22	100
JUN											
22...	7.5	93	101	59.5	.00	.80	3.5	.02	17	11	100
JUL											
13...	9.5	130	99	88.1	.01	.54	2.4	.05	20	14	100
AUG											
17...	7.3	103	95	246	.01	.40	1.8	.03	41	98	100
SEP											
21...	8.7	91	66	364	.01	--	--	.06	40	160	100

DATE	TIME	TOTAL ARSENIC (AS) (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	TOTAL CAD-MIUM (CD) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	TOTAL CHRO-MIUM (CR) (UG/L)	DIS-SOLVED CHRO-MIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	TOTAL IRON (FE) (UG/L)
OCT												
12...	1600	1	0	1	1	<10	<10	0	0	0	0	310
JAN												
18...	1530	1	1	--	1	<10	<10	0	0	20	0	310
MAY												
04...	1100	1	1	4	2	20	10	3	1	--	10	710
JUL												
13...	0900	3	1	0	0	10	1	0	0	5	2	1500

DATE	DIS-SOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	TOTAL MAN-GANESE (MN) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	TOTAL SELE-NIUM (SE) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	TOTAL ZINC (ZN) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	TOTAL ORGANIC CARBON (C) (MG/L)
OCT												
12...	20	3	3	50	20	<.5	<.5	0	0	10	10	5.4
JAN												
18...	50	--	6	30	10	<.5	<.5	0	0	20	20	5.8
MAY												
04...	190	40	12	20	10	<.5	<.5	0	0	10	10	8.5
JUL												
13...	70	27	8	50	20	.0	.0	0	0	40	10	5.6

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

PERIPHYTON

DATE	LENGTH OF EXPO-SURE (DAYS)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)
NOV				
11...	30	202	--	--
MAY				
25...	21	--	--	--
AUG				
17...	--	130000	.003	.004

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	OCT 12,76		NOV 11,76		DEC 14,76		JAN 18,77		FEB 23,77		MAY 4,77	
TIME	1600		1000		1530		1530		1045		1100	
TOTAL CELLS/ML	6400		900		570		770		70		1200	
DIVERSITY: DIVISION	0.6		1.3		0.7		0.8		0.9		1.3	
.CLASS	0.6		1.4		0.9		0.8		0.9		1.3	
..ORDER	0.6		1.4		1.3		0.9		0.9		1.3	
...FAMILY	1.3		2.5		3.3		1.3		1.8		1.6	
....GENUS	1.8		3.2		3.5		1.3		2.2		1.6	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)												
.CHLOROPHYCEAE												
..CHLOROCOCCALES												
...MICRACTINIACEAE												
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-	790#	66
...OOCYSTACEAE												
....ANKISTRODESMUS	--	-	12	1	5	1	--	-	10	14	12	1
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE												
....SCENEDESMUS	--	-	50	6	--	-	12	2	10	14	--	-
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES												
...DESMIDIACEAE												
....CLOSTERIUM	--	-	--	-	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	--	-	--	-	--	-	--	-
...ZYGNEMATACEAE												
....MOUGEOTIA	--	-	--	-	10	2	--	-	--	-	--	-
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	--	-	--	-	51	9	--	-	--	-	12	1
....MELOSIRA	*	0	--	-	--	-	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-	19	3	--	-	--	-
..PENNALES												
...ACHNANTHACEAE												
....ACHNANTHES	*	0	25	3	26	4	--	-	--	-	--	-
....COCCONEIS	92	1	12	1	51	9	12	2	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	--	-	*	0
...CYMBELLACEAE												
....AMPHORA	--	-	--	-	--	-	--	-	--	-	--	-
....CYMBELLA	46	1	50	6	31	5	--	-	*	0	--	-
....EPITHEMIA	--	-	12	1	15	3	19	3	--	-	*	0
...DIATOMACEAE												
....DIATOMA	69	1	12	1	26	4	--	-	15#	21	--	-
...FRAGILARIACEAE												
....ASTERIONELLA	160	3	--	-	--	-	12	2	10	14	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-	--	-	--	-
....SYNEDRA	*	0	50	6	15	3	8	1	25#	36	25	2
...GOMPHONEMATACEAE												
....GOMPHONEMA	69	1	37	4	26	4	4	1	*	0	*	0
...MERIDIONACEAE												
....MERIDION	--	-	--	-	--	-	8	1	--	-	--	-
...NAVICULACEAE												
....GYROSIGMA	*	0	12	1	--	-	--	-	--	-	--	-
....NAVICULA	210	3	100	11	120#	21	39	5	--	-	25	2
....PINNULARIA	--	-	--	-	--	-	8	1	--	-	--	-
....STAURONEIS	--	-	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE												
....NITZSCHIA	120	2	75	8	110#	19	8	1	--	-	100	8
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...OCHROMONADACEAE												
....DINOBRYON	*	0	--	-	15	3	--	-	--	-	--	-
....OCHROMONAS	--	-	12	1	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	OCT 12,76		NOV 11,76		DEC 14,76		JAN 18,77		FEB 23,77		MAY 4,77	
TIME	1600		1000		1530		1530		1045		1100	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..HORMOGONALES												
...NOSTOCACEAE												
....ANABAENA	710	11	--	-	--	-	--	-	--	-	210#	18
....APHANIZOMENON	4400#	69	--	-	41	7	--	-	--	-	--	-
...OSCILLATORIACEAE												
....LYNGBYA	--	-	170#	19	31	5	--	-	--	-	--	-
....OSCILLATORIA	460	7	260#	29	--	-	620#	81	--	-	--	-
..CHROCOCCALES												
...CHROCOCCACEAE												
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)												
.CRYPTOPHYCEAE												
..CRYPTOMONIDALES												
...CRYPTOMONODACEAE												
....CRYPTOMONAS	--	-	--	-	--	-	--	-	--	-	12	1
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-	--	-

DATE	MAY 25,77	JUN 22,77	JUL 13,77	AUG 17,77	SEP 21,77
TIME	0900	0900	0900	1200	1030
TOTAL CELLS/ML	2200	1800	560	3100	4300
DIVERSITY: DIVISION	0.6	0.4	0.8	0.9	0.7
.CLASS	0.6	0.4	0.8	0.9	0.7
..ORDER	1.4	0.4	0.9	1.9	0.7
...FAMILY	2.7	2.7	2.9	2.2	1.6
....GENUS	3.0	2.9	3.1	2.2	1.8

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	140	4	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	15	1	--	-	7	1	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	600	14
....KIRCHNERIELLA	--	-	--	-	99#	18	--	-	--	-
...SCENEDESMACEAE										
....SCENEDESMUS	62	3	--	-	26	5	--	-	*	0
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	15	1	--	-	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	15	1	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	--	-	*	0	--	-
...ZYGNEMATACEAE										
....MOUGEOTIA	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAY 25,77 0900		JUN 22,77 0900		JUL 13,77 0900		AUG 17,77 1200		SEP 21,77 1030	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	31	1	--	-	--	-	--	-	--	-
....MELOSIRA	530#	24	--	-	--	-	110	4	--	-
....STEPHANODISCUS	--	-	--	-	13	2	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	77	4	370#	20	7	1	--	-	--	-
....COCCONEIS	--	-	--	-	130#	22	68	2	*	0
....RHOICOSPHENIA	--	-	--	-	7	1	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	200	11	20	4	34	1	--	-
....CYMBELLA	140	6	120	6	20	4	--	-	--	-
....EPITHEMIA	31	1	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	15	1	170	9	33	6	110	4	*	0
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	--	-	--	-	*	0
....FRAGILARIA	--	-	--	-	--	-	62	2	--	-
....SYNEDRA	77	4	50	3	33	6	39	1	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	31	1	120	6	86#	15	--	-	*	0
...MERIDIONACEAE										
....MERIDION	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....GYROSIGMA	--	-	--	-	--	-	--	-	--	-
....NAVICULA	230	11	500#	28	86#	15	85	3	*	0
....PINNULARIA	46	2	--	-	--	-	--	-	--	-
....STAURONEIS	15	1	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	770#	35	170	9	--	-	*	0	*	0
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	*	0	--	-
....OCHROMONAS	--	-	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	1200#	38	1700#	39
....APHANIZOMENON	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	190	4
....OSCILLATORIA	77	4	130	7	--	-	--	-	1700#	40
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....GOMPHOSPHAERIA	--	-	--	-	--	-	1200#	40	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOMONODACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	--	-	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....TRACHELOMONAS	15	1	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	176	168	172	154	146	149	---	---	---	174	167	169
2	177	167	171	157	150	152	---	---	---	170	165	167
3	175	166	170	149	142	147	---	---	---	169	165	166
4	179	167	173	149	141	146	---	---	---	168	164	165
5	172	169	171	150	143	146	---	---	---	170	162	165
6	170	165	167	146	142	144	---	---	---	165	163	164
7	171	165	167	146	138	142	---	---	---	171	164	165
8	167	164	165	151	140	144	---	---	---	171	160	166
9	170	164	167	153	140	145	---	---	---	171	163	166
10	168	164	166	143	138	140	---	---	---	172	164	166
11	---	---	---	146	138	141	---	---	---	171	164	166
12	176	172	174	---	---	---	---	---	---	172	163	166
13	178	170	174	---	---	---	---	---	---	167	164	165
14	175	167	171	---	---	---	---	---	---	167	164	165
15	173	166	169	---	---	---	170	168	169	166	162	164
16	171	163	165	---	---	---	171	168	170	163	159	161
17	169	160	164	---	---	---	174	168	171	166	160	162
18	164	158	160	---	---	---	174	168	171	161	157	161
19	167	156	160	---	---	---	175	167	172	168	158	163
20	167	159	162	---	---	---	173	165	169	163	158	160
21	162	155	158	---	---	---	170	166	169	164	157	160
22	160	154	156	---	---	---	170	167	169	163	158	159
23	163	153	157	---	---	---	176	167	170	160	156	158
24	159	153	155	---	---	---	176	169	172	157	153	156
25	160	153	157	---	---	---	174	166	170	155	152	155
26	159	151	155	---	---	---	175	167	170	157	153	155
27	161	149	155	---	---	---	168	167	168	156	154	155
28	162	151	156	---	---	---	171	165	168	157	154	155
29	162	153	157	---	---	---	171	165	167	156	154	155
30	158	151	153	---	---	---	172	164	168	156	155	156
31	155	147	151	---	---	---	172	166	168	156	153	155
MONTH	179	147	163	157	138	145	176	167	170	174	152	162

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	157	153	155	156	152	154	81	79	80	---	---	---
2	155	148	154	161	152	156	86	80	82	---	---	---
3	155	153	154	158	153	156	91	87	88	134	125	130
4	155	152	154	159	155	157	93	90	92	137	121	129
5	157	151	154	158	154	156	93	92	92	139	121	129
6	159	150	153	157	153	156	98	92	95	146	140	143
7	151	147	150	159	154	156	99	96	97	151	147	149
8	150	146	149	156	153	154	101	96	99	152	144	148
9	159	147	151	160	156	158	104	101	102	150	144	147
10	159	135	148	159	156	158	105	95	102	150	144	147
11	168	156	161	163	157	160	93	52	74	155	149	152
12	160	151	156	176	162	168	83	53	70	161	153	157
13	151	147	149	174	161	164	84	56	75	162	155	158
14	150	146	148	161	137	151	84	65	77	171	159	166
15	149	146	147	141	134	138	90	74	85	168	163	166
16	153	146	149	146	133	138	87	83	85	167	161	164
17	156	147	151	157	147	152	92	84	87	163	153	158
18	152	147	150	163	157	159	93	86	91	164	149	152
19	152	147	150	168	163	166	95	92	93	158	133	146
20	152	148	150	171	167	169	95	93	94	---	148	---
21	151	148	150	178	171	175	101	93	97	153	145	149
22	153	149	151	181	177	179	97	93	96	150	146	148
23	151	148	149	184	181	182	98	93	96	---	145	---
24	152	148	151	186	182	184	100	98	98	163	132	148
25	154	150	152	189	185	187	---	---	---	162	142	152
26	152	149	151	192	186	189	---	---	---	---	---	---
27	153	150	151	191	111	172	---	---	---	---	---	---
28	154	150	152	120	101	113	---	---	---	---	---	---
29	---	---	---	125	81	101	---	---	---	---	---	---
30	---	---	---	81	49	60	---	---	---	---	---	---
31	---	---	---	79	49	62	---	---	---	---	---	---
MONTH	168	135	151	192	49	153	105	52	89	171	121	149

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	---	---	---	188	155	175	190	171	180
2	---	---	---	---	---	---	189	158	175	---	---	---
3	---	---	---	---	---	---	189	162	172	---	---	---
4	---	---	---	---	---	---	190	164	176	---	---	---
5	---	---	---	---	---	---	190	158	176	---	---	---
6	---	---	---	---	---	---	189	169	184	---	---	---
7	---	---	---	---	---	---	189	187	188	---	---	---
8	---	---	---	---	---	---	190	169	180	---	---	---
9	---	---	---	---	---	---	191	189	190	---	---	---
10	---	---	---	---	---	---	190	168	179	---	---	---
11	---	---	---	---	---	---	187	163	178	---	---	---
12	---	---	---	---	---	---	187	167	177	---	---	---
13	---	---	---	150	135	142	187	158	171	---	---	---
14	---	---	---	151	136	144	187	160	176	---	---	---
15	---	---	---	187	144	158	186	175	182	---	---	---
16	---	---	---	177	146	153	186	167	178	---	---	---
17	---	---	---	180	149	156	191	123	153	---	---	---
18	---	---	---	190	148	161	144	123	134	---	---	---
19	---	---	---	186	150	164	155	124	141	---	---	---
20	---	---	---	191	152	167	191	151	171	134	122	128
21	---	---	---	190	152	171	---	---	---	126	118	122
22	---	---	---	191	154	172	---	---	---	122	119	121
23	---	---	---	189	154	172	---	---	---	131	122	126
24	165	148	160	190	157	174	---	---	---	147	128	138
25	162	146	156	191	153	172	---	---	---	173	146	157
26	157	145	151	190	162	176	---	---	---	---	---	---
27	152	141	147	177	159	168	---	---	---	---	---	---
28	---	---	---	190	159	174	---	---	---	---	---	---
29	---	---	---	190	156	173	---	---	---	---	---	---
30	---	---	---	188	165	175	191	168	179	---	---	---
31	---	---	---	188	164	176	186	158	170	---	---	---
MONTH	165	141	154	191	135	166	191	123	173	190	118	139

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	13.0	10.0	11.5	3.5	.5	2.5	.0	.0	.0	.0	.0	.0
2	13.0	11.0	12.0	4.5	2.5	3.5	.0	.0	.0	.0	.0	.0
3	13.5	9.5	11.5	4.0	2.5	3.0	.0	.0	.0	.0	.0	.0
4	13.5	12.5	13.0	3.5	.5	2.5	.0	.0	.0	.0	.0	.0
5	13.0	11.0	12.0	3.5	2.0	3.0	.0	.0	.0	.0	.0	.0
6	11.0	8.5	9.5	2.5	1.0	2.0	.0	.0	.0	.0	.0	.0
7	8.5	6.5	7.5	2.5	.5	1.5	.0	.0	.0	.0	.0	.0
8	9.5	6.0	8.0	2.5	.5	1.5	.0	.0	.0	.0	.0	.0
9	9.0	6.0	7.5	2.0	.5	1.0	.0	.0	.0	.0	.0	.0
10	---	6.5	---	1.5	.5	1.0	.0	.0	.0	.0	.0	.0
11	---	---	---	.5	.5	.5	.0	.0	.0	.0	.0	.0
12	12.0	---	---	---	---	---	.0	.0	.0	.0	.0	.0
13	10.5	8.5	9.5	---	---	---	.0	.0	.0	.0	.0	.0
14	10.5	6.5	8.5	---	---	---	.0	.0	.0	.0	.0	.0
15	9.5	7.0	8.0	---	---	---	.0	.0	.0	.0	.0	.0
16	8.0	6.0	7.5	---	---	---	.0	.0	.0	.0	.0	.0
17	7.5	5.0	6.5	---	---	---	.0	.0	.0	.0	.0	.0
18	6.0	3.5	4.5	---	---	---	.0	.0	.0	.0	.0	.0
19	6.5	3.5	4.5	---	---	---	.0	.0	.0	.0	.0	.0
20	6.5	4.0	5.5	---	---	---	.0	.0	.0	.0	.0	.0
21	6.0	3.0	4.5	---	---	---	.0	.0	.0	.0	.0	.0
22	5.0	2.5	3.5	---	---	---	.0	.0	.0	.0	.0	.0
23	5.5	3.5	5.0	---	---	---	.0	.0	.0	.0	.0	.0
24	4.5	3.0	3.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
25	4.5	2.5	4.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
26	4.0	1.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
27	4.5	1.0	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	5.0	1.0	3.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	5.5	2.5	4.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
30	4.5	3.0	3.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
31	4.5	1.5	3.5	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	13.5	1.0	6.5	4.5	.0	1.0	.0	.0	.0	.0	.0	.0

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	2.5	1.5	2.0	---	---	---
2	.0	.0	.0	.0	.0	.0	2.5	2.0	2.0	---	---	---
3	.0	.0	.0	.0	.0	.0	3.5	1.5	2.5	15.0	---	---
4	.0	.0	.0	.0	.0	.0	3.0	2.0	2.5	14.5	11.5	13.0
5	.0	.0	.0	.0	.0	.0	2.0	1.0	1.5	16.5	13.5	14.5
6	.0	.0	.0	.0	.0	.0	3.0	1.0	2.0	16.0	13.5	14.0
7	.0	.0	.0	.0	.0	.0	2.5	1.0	1.5	15.0	11.0	13.0
8	.0	.0	.0	.0	.0	.0	3.5	1.0	2.0	15.0	11.5	13.5
9	.0	.0	.0	.0	.0	.0	4.5	1.5	3.0	15.0	11.5	13.0
10	.0	.0	.0	.5	.0	.5	5.5	3.0	4.0	15.5	11.5	13.5
11	.0	.0	.0	.5	.5	.5	5.0	4.0	4.5	18.0	13.0	15.0
12	.0	.0	.0	.5	.5	.5	6.5	5.0	5.5	19.5	14.5	17.0
13	.0	.0	.0	1.0	.5	.5	7.0	6.0	6.5	19.5	16.5	18.0
14	.0	.0	.0	1.0	.5	.5	8.0	6.0	7.0	21.5	17.5	19.5
15	.0	.0	.0	.5	.5	.5	9.0	7.0	8.0	21.0	18.0	19.5
16	.0	.0	.0	1.0	.5	.5	10.5	8.5	9.5	22.5	18.5	20.0
17	.0	.0	.0	1.0	.5	1.0	11.0	10.0	10.5	22.5	19.5	21.0
18	.0	.0	.0	1.0	.5	1.0	12.0	10.5	11.0	24.0	19.5	21.5
19	.0	.0	.0	1.0	1.0	1.0	12.5	11.0	11.5	23.0	20.0	21.5
20	.0	.0	.0	1.0	1.0	1.0	12.5	11.5	12.0	23.0	20.0	21.5
21	.0	.0	.0	1.5	1.0	1.0	12.0	11.0	11.5	22.5	20.5	21.5
22	.0	.0	.0	1.5	1.0	1.5	11.5	10.5	11.0	22.5	20.0	21.5
23	.0	.0	.0	2.0	1.0	1.5	13.0	10.5	11.5	21.5	18.5	20.0
24	.0	.0	.0	1.5	1.0	1.5	11.0	10.0	10.5	21.5	18.5	19.5
25	.0	.0	.0	2.5	1.0	1.5	---	---	---	22.0	19.0	20.5
26	.0	.0	.0	3.5	1.5	2.0	---	---	---	22.0	22.0	22.0
27	.0	.0	.0	2.5	1.0	2.0	---	---	---	---	---	---
28	.0	.0	.0	1.5	1.0	1.5	---	---	---	---	---	---
29	---	---	---	1.5	1.0	1.0	---	---	---	---	---	---
30	---	---	---	1.5	1.0	1.0	---	---	---	---	---	---
31	---	---	---	2.5	1.0	2.0	---	---	---	---	---	---
MONTH	.0	.0	.0	3.5	.0	1.0	13.0	1.0	6.5	24.0	11.0	18.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	20.5	20.0	20.0	20.5	16.5	18.5	17.5	16.5	17.0
2	---	---	---	21.0	19.5	20.0	21.5	16.0	18.5	17.0	16.5	16.5
3	---	---	---	21.5	20.0	20.5	21.0	15.5	18.5	16.5	15.5	16.0
4	---	---	---	21.5	21.0	21.5	19.5	17.0	18.5	16.5	15.5	15.5
5	---	---	---	23.0	21.5	22.0	20.5	16.5	18.5	15.5	15.0	15.0
6	---	---	---	23.5	23.0	23.0	19.0	16.0	17.5	15.0	15.0	15.0
7	---	---	---	24.0	23.0	23.0	20.0	17.0	18.5	15.0	14.5	15.0
8	---	---	---	24.0	23.5	24.0	22.0	18.0	20.0	15.0	15.0	15.0
9	---	---	---	24.0	23.0	23.5	18.5	16.5	17.5	15.5	15.0	15.0
10	---	---	---	24.0	22.5	23.0	19.0	16.5	17.5	15.0	15.0	15.0
11	---	---	---	23.5	22.5	23.0	18.0	15.0	16.5	15.0	14.5	15.0
12	---	---	---	25.5	23.5	24.0	17.5	14.0	15.5	15.0	13.5	14.5
13	---	---	---	26.0	21.0	23.5	20.0	15.5	17.5	14.5	14.5	14.5
14	---	---	---	26.0	22.5	24.5	17.5	14.5	16.0	14.5	14.0	14.5
15	---	---	---	26.0	23.0	24.5	16.0	14.5	15.5	14.5	13.0	14.0
16	---	---	---	25.5	22.5	24.0	16.0	14.5	15.0	14.5	13.0	14.0
17	---	---	---	26.0	23.0	24.5	17.5	13.0	16.0	14.5	14.0	14.0
18	---	---	---	27.0	23.0	24.5	17.5	12.0	16.0	14.5	13.0	14.0
19	---	---	---	28.0	24.0	25.5	18.0	13.5	16.5	14.5	14.5	14.5
20	---	---	---	26.0	24.5	25.5	16.5	13.5	15.5	14.5	11.0	13.0
21	21.5	21.0	21.5	25.0	22.5	24.0	17.0	14.0	16.0	12.0	10.0	11.0
22	24.0	20.0	22.0	25.5	20.5	23.5	16.0	14.0	15.0	10.5	10.5	10.5
23	22.5	21.0	21.5	26.0	22.0	24.0	15.5	13.0	14.0	10.5	10.0	10.5
24	23.5	19.5	21.5	26.0	22.5	24.0	15.0	12.0	14.0	11.0	10.5	10.5
25	25.0	20.5	23.0	24.5	21.0	23.0	16.5	12.0	14.0	11.5	11.0	11.5
26	25.5	20.5	23.0	24.5	19.0	22.0	17.0	15.0	16.0	11.5	11.5	11.5
27	24.5	22.5	23.5	23.5	19.5	22.0	18.0	17.0	17.0	11.5	11.5	11.5
28	22.5	22.0	22.0	22.5	19.0	21.0	18.5	17.5	18.0	11.5	11.0	11.0
29	22.5	20.5	21.5	23.0	18.5	20.5	17.0	15.5	16.5	12.0	11.5	11.5
30	22.0	20.5	21.0	21.5	18.0	20.0	17.0	15.0	16.0	11.5	11.0	11.0
31	---	---	---	21.0	18.5	19.5	18.0	16.5	17.0	---	---	---
MONTH	25.5	19.5	22.0	28.0	18.0	23.0	22.0	12.0	16.5	17.5	10.0	13.5

04040500 STURGEON RIVER NEAR SIDNAW, MI

LOCATION.--Lat 46°35'03", long 88°34'33", in NE¼ SE¼ sec.5, T.48 N., R.34 W., Baraga County, Hydrologic Unit 04020104, on right bank 30 ft (9 m) downstream from highway bridge, 3.0 mi (4.8 km) downstream from Rock River, 3.5 mi (5.6 km) northwest of Covington, 6.5 mi (10.5 km) upstream from Perch River, 8.5 mi (13.7 km) northeast of Sidnaw, and at mile 71 (114 km).

DRAINAGE AREA.--171 mi² (443 km²).

PERIOD OF RECORD.--October 1912 to September 1915, April 1943 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1507: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,214.40 ft (370.149 m) above mean sea level. October 1912 to September 1915, non-recording gage at site 200 ft (61 m) upstream at different datum. April 2, 1943, to October 1, 1946, nonrecording gage at present site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years, 210 ft³/s (5.947 m³/s), 16.68 in/yr (424 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,630 ft³/s (131 m³/s) Apr. 24, 1960, gage height, 11.63 ft (3.545 m); minimum, 2.7 ft³/s (0.076 m³/s) Sept. 13, 1976, gage height, 3.17 ft (0.966 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,240 ft³/s (63.4 m³/s) Apr. 16, gage height, 8.32 ft (2.536 m); minimum, 5.9 ft³/s (0.17 m³/s) Oct. 4, 6, gage height, 3.33 ft (1.01 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.1	19	16	16	15	17	860	264	41	73	26	188
2	6.8	19	16	16	15	16	730	225	61	83	25	180
3	6.2	20	16	16	15	16	600	195	64	105	24	153
4	5.9	23	16	16	15	15	530	171	64	155	26	359
5	6.2	23	16	16	15	15	350	165	64	210	29	500
6	5.9	21	16	16	15	15	340	167	64	202	27	464
7	6.2	19	16	16	15	16	330	151	62	149	25	456
8	6.5	16	16	16	15	17	330	137	70	108	22	378
9	7.4	18	16	16	15	19	330	122	72	82	19	322
10	8.0	18	16	16	15	23	464	112	65	65	24	270
11	7.7	17	16	16	15	36	896	103	54	52	33	218
12	7.4	17	16	16	15	124	1190	99	45	39	31	182
13	7.7	17	16	16	15	371	1590	92	40	36	38	159
14	8.6	16	16	16	15	371	1770	89	35	38	43	141
15	10	16	16	16	15	452	1850	87	31	107	40	122
16	13	16	16	15	15	410	2190	79	29	107	45	112
17	13	16	16	15	15	350	1980	73	30	215	54	107
18	13	16	15	15	15	336	1730	89	31	178	55	102
19	13	16	16	15	15	300	1630	89	37	130	49	141
20	13	16	16	15	15	279	1470	82	28	92	41	192
21	14	16	16	15	15	250	1400	96	24	67	38	202
22	18	16	16	15	16	220	1380	108	21	53	35	188
23	18	16	16	15	16	200	1140	128	19	42	33	218
24	16	16	16	15	17	165	866	107	18	35	28	243
25	16	16	16	15	17	150	730	89	18	31	26	340
26	15	16	16	15	17	151	600	75	18	25	24	357
27	15	16	16	15	17	326	488	64	21	20	23	354
28	14	16	16	15	17	505	406	54	37	23	25	392
29	16	16	16	15	---	860	343	46	36	27	28	413
30	20	16	16	15	---	1010	300	40	39	22	30	396
31	21	---	16	15	---	955	---	36	---	25	80	---
TOTAL	355.6	519	495	480	432	7990	28813	3434	1238	2596	1046	7849
MEAN	11.5	17.3	16.0	15.5	15.4	258	960	111	41.3	83.7	33.7	262
MAX	21	23	16	16	17	1010	2190	264	72	215	80	500
MIN	5.9	16	15	15	15	15	300	36	18	20	19	102
CFSM	.07	.10	.09	.09	.09	1.51	5.61	.65	.24	.49	.20	1.53
IN.	.08	.11	.11	.10	.09	1.74	6.27	.75	.27	.56	.23	1.71

CAL YR 1976 TOTAL 59113.2 MEAN 162 MAX 2620 MIN 2.7 CFSM .95 IN 12.86
WTR YR 1977 TOTAL 55247.6 MEAN 151 MAX 2190 MIN 5.9 CFSM .88 IN 12.02

04041500 STURGEON RIVER NEAR ALSTON, MI

LOCATION.--Lat 46°43'35", long 88°39'43", in SE¼ sec.15, T.50 N., R.35 W., Baraga County, Hydrologic Unit 04020104, on right bank in powerhouse of Upper Peninsula Power Co. at Prickett Dam, 4.0 mi (6.4 km) upstream from Clear Creek, 5.0 mi (8.0 km) southeast of Alston, and at mile 45 (72 km).

DRAINAGE AREA.--346 mi² (896 km²).

PERIOD OF RECORD.--February 1932 to June 1941, October 1942 to current year. Monthly discharge only for some periods, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 710.3 ft (216.50 m) above mean tide at New York City (levels by Corps of Engineers). Prior to October 1, 1963, at datum 40.00 ft (12.192 m) lower.

REMARKS.--Records good except those below 20 ft³/s (0.57 m³/s), which are poor. Flow regulated by powerplant at station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--43 years, (water years 1933-40, 1943-77), 417 ft³/s (11.81 m³/s), 16.37 in/yr (416 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,360 ft³/s (208 m³/s) Apr. 24, 1960, gage height, 13.09 ft (3.990 m) present datum; minimum daily, 1 ft³/s (0.03 m³/s) Aug. 14-19, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,580 ft³/s (73.1 m³/s) Apr. 16, gage height, 7.62 ft (2.323 m); minimum, 7.8 ft³/s (0.221 m³/s) Oct. 5, 6, 28, 29, Nov. 2, 3, 4, 5, gage height, 2.49 ft (0.759 m); minimum daily, 8.3 ft³/s (0.235 m³/s) Oct. 2, 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	127	130	150	13	150	195	969	615	236	220	193	241
2	8.3	129	152	13	152	171	917	611	235	15	192	314
3	8.3	128	151	155	150	194	833	598	233	15	188	314
4	129	131	13	148	145	205	607	401	16	15	189	391
5	129	127	13	154	16	211	613	399	12	307	188	633
6	124	151	135	154	15	209	613	402	234	302	15	635
7	128	14	145	153	160	200	613	350	232	301	15	640
8	130	153	149	13	165	200	612	351	234	304	189	635
9	130	116	150	13	174	207	611	292	234	257	189	586
10	130	165	150	160	149	188	605	245	231	15	139	633
11	129	160	12	160	168	148	851	251	15	266	136	630
12	129	165	12	160	15	317	1480	256	15	553	129	525
13	130	144	156	160	14	382	1760	249	235	320	15	316
14	128	13	151	160	159	736	2140	251	231	15	15	314
15	128	292	135	15	158	697	2140	252	231	269	141	313
16	128	13	140	14	158	669	2410	233	232	15	137	266
17	129	13	75	160	158	745	2450	231	236	15	130	266
18	128	98	12	160	157	597	1820	411	17	321	134	266
19	129	143	12	160	13	594	1980	228	15	324	151	266
20	127	148	137	160	12	597	1640	232	29	321	14	265
21	127	14	147	160	270	377	1680	233	78	322	14	264
22	128	180	142	20	272	378	1710	13	201	322	137	268
23	127	167	148	15	263	377	1450	233	235	15	132	312
24	128	167	12	160	262	379	1270	232	237	15	149	364
25	128	166	12	155	199	335	1040	235	15	320	155	392
26	128	167	12	146	198	379	978	233	15	346	149	463
27	127	13	12	160	198	378	736	234	239	243	14	630
28	123	13	155	150	195	380	626	227	316	192	14	626
29	127	148	150	16	---	1100	618	15	240	191	192	628
30	127	154	151	15	---	1490	619	236	238	15	191	628
31	131	---	149	150	---	1210	---	237	---	14	192	---
TOTAL	3729.6	3614	3140	3432	4145	14245	36391	8986	4959	6165	3838	13024
MEAN	120	120	101	111	148	460	1213	290	165	199	124	434
MAX	131	292	156	160	272	1490	2450	615	316	553	193	640
MIN	8.3	13	12	13	12	148	605	13	12	14	14	241
CFSM	.35	.35	.29	.32	.43	1.33	3.51	.84	.48	.58	.36	1.25
IN.	.40	.39	.34	.37	.45	1.53	3.91	.97	.53	.66	.41	1.40

CAL YR 1976 TOTAL 119933.8 MEAN 328 MAX 3460 MIN 6.2 CFSM .95 IN 12.89
WTR YR 1977 TOTAL 105668.6 MEAN 290 MAX 2450 MIN 8.3 CFSM .84 IN 11.36

04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI

LOCATION.--Lat 47°13'43", long 88°23'07", in SE¼ SE¼ sec.20, T.56 N., R.32 W., Houghton County, Hydrologic Unit 04020103, on right bank 20 ft (6 m) upstream from bridge on county highway, 2.0 mi (3.2 km) northeast of Lake Linden, and 3.0 mi (4.8 km) upstream from mouth.

DRAINAGE AREA.--28.0 mi² (72.5 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1964 and 1966. October 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 621.7 ft (189.49 m) above mean sea level.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Since 1973, flow includes about 0.1 ft³/s (0.003 m³/s) mine pumpage. Small diversions for sprinkler irrigation.

AVERAGE DISCHARGE.--11 years, 42.8 ft³/s (1.212 m³/s), 20.76 in/yr (527 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,180 ft³/s (33.4 m³/s) May 2, 1972, gage height, 9.30 ft (2.835 m); minimum daily, 6.8 ft³/s (0.19 m³/s) Oct. 3, 1976; minimum gage height, 3.85 ft (1.173 m) June 23, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 380 ft³/s (10.8 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 29	2400	*700	19.8	*7.77	2.368	Apr. 12	0400	614	17.4	7.38	2.252

Minimum daily discharge, 6.8 ft³/s (0.19 m³/s) Oct. 3; minimum gage height, 3.85 ft (1.173 m) June 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.0	9.8	9.0	9.4	9.0	9.0	220	35	14	18	15	15
2	7.0	9.7	9.0	9.2	9.0	9.0	149	32	16	18	14	13
3	6.8	10	9.0	9.2	9.0	9.0	113	29	14	50	14	11
4	7.0	10	9.0	9.0	9.0	9.0	95	30	14	60	15	32
5	7.0	10	9.0	9.0	9.0	9.0	70	36	13	43	13	37
6	7.4	10	9.0	9.8	9.0	9.0	65	41	14	178	12	24
7	7.5	9.9	9.0	9.0	9.0	9.0	59	32	13	105	11	19
8	7.5	9.6	9.0	9.0	9.0	9.0	49	27	12	48	11	16
9	7.8	9.7	9.2	9.0	9.0	9.0	49	25	11	30	11	136
10	7.8	9.8	9.4	9.0	9.0	9.0	90	22	11	22	11	77
11	7.8	9.6	9.4	9.8	9.0	11	315	21	12	18	11	39
12	8.0	9.6	9.6	9.0	9.0	13	510	20	11	16	9.9	27
13	8.0	9.6	9.6	9.0	9.0	40	481	19	11	14	10	21
14	8.2	9.6	9.8	9.0	9.0	301	424	18	10	13	9.9	18
15	8.5	9.6	10	9.0	9.0	150	393	18	10	13	9.9	16
16	9.5	9.5	9.5	9.0	9.0	192	405	17	11	12	10	15
17	9.3	9.5	9.2	9.0	9.0	178	396	17	12	12	9.9	15
18	9.2	9.6	9.2	9.0	9.0	133	294	26	12	12	9.9	15
19	9.2	9.6	9.2	9.0	9.0	116	310	23	14	11	9.9	30
20	9.6	9.9	8.9	9.0	9.0	101	218	19	14	12	10	43
21	13	9.6	9.3	9.0	9.0	85	198	20	11	12	9.9	34
22	10	9.6	9.2	9.0	9.0	76	162	21	11	11	9.9	26
23	9.6	9.6	9.3	9.0	9.0	70	101	21	9.2	11	8.8	26
24	9.7	9.5	9.2	9.0	9.0	60	78	18	9.9	10	8.5	88
25	9.9	9.6	9.2	9.0	9.0	45	64	16	9.6	10	8.5	238
26	10	9.7	9.4	9.0	9.0	37	55	15	9.6	10	9.2	124
27	9.3	9.6	9.4	9.0	9.0	58	49	14	9.9	9.8	12	120
28	9.1	9.4	9.4	9.0	9.0	128	45	14	11	10	13	88
29	9.8	9.4	9.4	9.0	---	447	39	13	10	11	11	134
30	9.9	9.2	9.4	9.0	---	560	38	12	11	10	10	106
31	9.7	---	9.4	9.0	---	333	---	12	---	19	14	---
TOTAL	270.1	289.8	287.6	279.8	252.0	3224.0	5534	683	351.2	828.8	342.2	1603
MEAN	8.71	9.66	9.28	9.03	9.00	104	184	22.0	11.7	26.7	11.0	53.4
MAX	13	10	10	9.4	9.0	560	510	41	16	178	15	238
MIN	6.8	9.2	8.9	9.0	9.0	9.0	38	12	9.2	9.8	8.5	11
CFSM	.31	.35	.33	.32	.32	3.71	6.57	.79	.42	.95	.39	1.91
IN.	.36	.39	.38	.37	.33	4.28	7.35	.91	.47	1.10	.45	2.13

CAL YR 1976 TOTAL 14475.2 MEAN 39.5 MAX 819 MIN 6.8 CFSM 1.41 IN 19.23
WTR YR 1977 TOTAL 13945.5 MEAN 38.2 MAX 560 MIN 6.8 CFSM 1.36 IN 18.53

04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1971 to current year.

INSTRUMENTATION.--Temperature recorder since Oct. 1, 1971.

REMARKS.--Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.5°C July 30, 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 24.0°C July 19; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	12.0	9.0	4.5	3.5	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
2	11.5	9.5	5.5	4.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
3	11.5	9.0	---	---	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
4	11.5	10.5	---	---	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
5	11.5	10.5	---	---	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
6	10.5	8.5	---	---	1.0	1.0	0.0	0.0	0.0	0.0	0.5	0.0
7	8.5	7.5	---	---	1.0	1.0	0.0	0.0	0.0	0.0	0.5	0.5
8	8.5	7.5	---	---	1.0	1.0	0.0	0.0	0.0	0.0	0.5	0.5
9	8.5	8.0	---	---	1.0	0.5	0.0	0.0	0.0	0.0	0.5	0.5
10	8.5	8.0	1.5	1.0	0.5	0.5	0.0	0.0	0.0	0.0	1.0	0.5
11	8.5	7.0	1.5	1.0	0.5	0.5	0.0	0.0	0.0	0.0	2.0	1.0
12	10.5	8.0	2.5	1.5	0.5	0.5	0.0	0.0	0.0	0.0	1.5	1.5
13	10.5	9.5	2.0	1.5	0.5	0.5	0.0	0.0	0.0	0.0	1.5	1.0
14	9.5	7.5	2.0	1.0	0.5	0.5	0.0	0.0	0.0	0.0	1.0	1.0
15	8.0	7.0	2.0	1.5	0.5	0.0	0.0	0.0	0.0	0.0	1.0	1.0
16	7.0	6.0	3.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5
17	6.0	4.5	2.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5
18	5.0	4.5	2.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.5
19	5.5	5.0	3.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.5
20	6.0	5.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.5
21	6.0	5.0	2.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.0
22	5.5	4.5	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.5
23	5.5	4.5	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.5
24	6.0	4.5	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
25	5.0	4.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.5
26	4.5	3.5	1.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.5
27	5.0	4.0	1.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	2.0
28	5.5	3.5	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	1.5
29	7.5	5.0	1.0	1.0	0.0	0.0	0.0	0.0	---	---	1.5	1.0
30	6.0	5.0	1.0	1.0	0.0	0.0	0.0	0.0	---	---	1.5	1.0
31	5.5	4.0	---	---	0.0	0.0	0.0	0.0	---	---	2.5	1.0
MONTH	12.0	3.5	5.5	1.0	1.0	0.0	0.0	0.0	0.0	0.0	3.5	0.0

04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	2.0	1.0	13.5	10.5	14.5	12.0	16.0	14.5	17.0	14.5	17.0	15.0
2	2.0	1.5	13.0	9.0	16.0	10.0	19.0	12.5	18.0	13.5	16.5	14.5
3	3.0	1.0	13.0	8.5	17.5	11.0	18.5	15.0	17.0	14.0	17.0	13.5
4	2.5	1.5	12.5	8.5	19.5	15.0	18.5	16.0	17.0	15.0	16.0	14.5
5	1.5	1.0	12.5	10.0	18.5	15.0	18.0	16.5	18.5	15.0	14.5	14.0
6	2.5	1.0	12.0	9.0	16.0	13.0	20.0	17.0	18.5	15.0	14.0	13.5
7	3.5	1.5	12.0	7.5	15.0	12.0	20.5	16.5	20.0	16.5	15.0	13.0
8	4.0	1.0	13.0	8.5	16.5	11.5	20.5	17.5	20.5	17.5	14.5	12.5
9	5.0	1.5	13.0	7.5	17.0	12.0	19.5	16.5	18.0	16.0	14.5	14.0
10	5.5	2.0	11.0	8.0	16.0	12.5	19.0	14.0	17.5	16.0	14.5	13.0
11	4.5	1.5	15.0	8.0	16.5	14.0	19.5	15.0	17.5	15.0	14.5	12.0
12	3.5	1.5	17.5	11.0	18.0	14.0	20.5	16.0	15.5	14.5	14.0	12.0
13	5.0	2.0	18.0	13.5	17.5	13.5	21.0	16.5	18.0	14.5	14.5	12.0
14	5.5	1.5	18.0	12.0	17.5	14.0	20.5	17.5	18.5	15.0	14.5	11.5
15	6.0	3.0	17.5	12.5	16.5	15.0	22.0	18.0	16.5	15.0	14.0	11.5
16	8.0	3.5	19.5	13.5	15.0	14.0	21.0	17.5	15.5	15.0	14.0	12.0
17	6.5	5.0	20.0	14.5	19.5	14.0	21.0	17.0	17.5	14.5	13.0	12.0
18	9.0	5.5	20.0	15.0	19.0	16.5	22.5	17.5	17.0	14.0	14.0	12.5
19	8.5	7.5	19.0	15.0	20.0	15.0	24.0	19.5	17.5	15.0	14.0	12.0
20	8.5	7.5	18.0	14.5	20.5	16.0	23.5	19.5	15.5	13.5	12.0	11.0
21	9.0	7.5	17.0	15.0	21.0	16.0	21.5	17.0	16.0	13.5	12.5	10.0
22	10.0	7.0	18.5	14.0	19.5	16.5	21.5	16.5	16.0	13.5	11.5	10.5
23	10.5	7.5	17.0	14.5	18.5	15.5	22.5	18.5	15.5	13.0	12.0	11.5
24	9.0	7.0	19.0	14.0	20.0	14.5	21.5	20.0	16.0	12.5	12.0	12.0
25	10.0	6.0	19.0	14.0	21.0	16.5	21.0	17.0	16.0	12.0	12.5	12.0
26	11.5	7.0	19.5	13.5	20.5	16.5	20.5	16.0	16.0	14.5	12.5	12.5
27	10.0	8.5	20.5	14.5	21.0	18.0	19.5	17.0	16.5	15.5	12.5	12.0
28	10.0	6.0	20.5	15.0	20.5	18.0	18.5	16.5	18.0	16.0	13.0	12.0
29	10.0	6.5	18.0	14.0	20.5	16.0	16.5	16.0	17.5	14.5	12.5	12.0
30	13.5	8.0	18.5	14.0	19.0	16.0	16.5	14.0	16.0	14.5	12.0	11.0
31	---	---	17.5	14.5	---	---	18.5	14.5	17.5	15.5	---	---
MONTH	13.5	1.0	20.5	7.5	21.0	10.0	24.0	12.5	20.5	12.0	17.0	10.0

04044400 CARP RIVER NEAR NEGAUNEE, MI

LOCATION.--Lat 46°31'29", long 87°34'25", in SE¼ sec.29, T.48 N., R.26 W., Marquette County, Hydrologic Unit 04020105, on right bank 30 ft (9 m) downstream from bridge on U.S. Highway 41, and 2.0 mi (3.2 km) northeast of Negaunee.

DRAINAGE AREA.--51.4 mi² (133.1 km²).

PERIOD OF RECORD.--July 1961 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,319.90 ft (402.306 m) above mean sea level (Michigan Department of Highway and Transportation bench mark). Prior to Aug. 24, 1961, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by Deer Lake storage reservoir (capacity, 22,500 acre-ft or 27.7 hm³) 5 mi (8 km) above station. The city of Ishpeming diverted an average of 3.0 ft³/s (0.085 m³/s) into basin as waste effluent (see sta 04058200). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--16 years, 59.0 ft³/s (1.671 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 351 ft³/s (9.94 m³/s) June 27, 28, 1968, gage height, 4.68 ft (1.426 m); maximum gage height, 5.24 ft (1.597 m) Mar. 2, 1972, backwater from ice; minimum discharge, 3.7 ft³/s (0.10 m³/s) July 29, 1965; minimum gage height, 1.94 ft (0.591 m) Aug. 1, 1962; minimum daily discharge, 3.9 ft³/s (0.11 m³/s) July 29, 30, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 152 ft³/s (4.30 m³/s) Apr. 12, 13, gage height, 3.65 ft (1.113 m); minimum, 8.8 ft³/s (0.249 m³/s) Oct. 15, gage height, 2.19 ft (0.668 m); minimum gage height, 2.16 ft (0.658 m) Aug. 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	46	37	45	39	38	42	69	38	60	36	39	66
2	38	37	44	39	38	43	56	37	47	34	33	53
3	32	38	43	39	39	44	53	36	37	33	23	49
4	31	38	43	39	39	46	44	35	36	34	19	56
5	23	38	42	39	40	48	29	37	35	33	16	60
6	13	37	42	39	40	50	68	38	41	32	14	57
7	12	37	41	39	40	52	45	36	39	31	12	59
8	11	38	41	38	40	54	39	35	35	30	11	55
9	10	43	41	38	41	55	38	34	34	29	11	52
10	10	42	40	38	42	56	54	34	33	29	14	50
11	10	40	40	38	43	57	103	34	35	29	14	48
12	9.8	37	40	38	43	61	142	33	33	29	12	47
13	10	43	40	38	41	76	146	33	33	30	14	47
14	9.8	38	40	38	39	70	100	33	32	35	30	46
15	9.7	45	40	38	39	49	84	32	31	70	34	45
16	11	51	40	38	40	40	86	32	32	57	38	29
17	11	44	40	38	42	46	72	33	32	46	43	18
18	10	44	40	38	42	30	62	35	32	39	47	16
19	28	43	39	38	42	61	60	33	31	35	45	21
20	36	43	38	38	42	55	47	34	31	33	45	32
21	36	42	35	38	42	54	71	38	30	32	46	27
22	38	34	38	38	42	54	77	36	29	31	46	21
23	37	42	39	37	42	48	40	33	30	31	48	21
24	36	43	39	36	42	35	32	32	30	30	45	24
25	36	44	40	35	42	35	30	32	31	32	44	41
26	37	45	40	34	42	33	25	31	30	31	44	37
27	37	46	40	34	42	47	21	31	40	30	47	28
28	37	31	40	35	42	59	20	31	53	32	47	42
29	38	45	39	36	---	113	25	31	38	34	46	57
30	39	45	39	37	---	126	39	30	34	34	43	58
31	39	---	39	37	---	93	---	33	---	39	59	---
TOTAL	781.3	1230	1247	1164	1146	1732	1777	1050	1064	1080	1029	1262
MEAN	25.2	41.0	40.2	37.5	40.9	55.9	59.2	33.9	35.5	34.8	33.2	42.1
MAX	46	51	45	39	43	126	146	38	60	70	59	66
MIN	9.7	31	35	34	38	30	20	30	29	29	11	16

CAL YR 1976 TOTAL 22969.3 MEAN 62.8 MAX 175 MIN 9.7
WTR YR 1977 TOTAL 14562.3 MEAN 39.9 MAX 146 MIN 9.7

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI

LOCATION.--Lat 46°34'30", long 85°16'10", in NE¼ sec.11, T.48 N., R.8 W., Luce County, Hydrologic Unit 04020202, on left bank 0.7 mi (1.1 km) upstream from Tahquamenon (Big) Falls, 11.5 mi (18.5 km) west of Tahquamenon Paradise, and 19 mi (31 km) northeast of Newberry.

DRAINAGE AREA.--790 mi² (2,046 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1953 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 697 ft (212.4 m) from river-profile map (nearest ft).

REMARKS.--Water-discharge record good.

AVERAGE DISCHARGE.--24 years, 923 ft³/s (26.14 m³/s), 15.87 in/yr (403 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,990 ft³/s (198 m³/s) May 10, 1960, gage height, 10.26 ft (3.127 m); minimum, 157 ft³/s (4.45 m³/s) July 26, 1955; minimum gage height, 2.86 ft (0.872 m) July 7, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,600 ft³/s (159 m³/s) Apr. 21, gage height, 9.33 ft (2.844 m); minimum, 225 ft³/s (6.37 m³/s) June 17, gage height, 3.08 ft (0.939 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	276	447	346	344	346	440	3320	3860	290	895	336	1250
2	266	439	353	334	344	450	3540	3560	285	935	362	1300
3	273	438	346	330	344	457	3690	3300	300	949	358	1300
4	272	445	335	329	342	479	3740	3020	288	990	337	1260
5	280	477	328	327	345	486	3450	2740	286	1020	328	1200
6	313	483	324	331	350	470	3540	2460	289	1020	334	1130
7	351	480	322	333	354	456	3500	2200	341	986	343	1050
8	360	480	324	335	357	448	3480	1920	382	935	336	982
9	352	467	321	335	357	445	3300	1740	364	857	325	918
10	348	456	319	333	358	455	3280	1560	387	787	311	798
11	347	447	318	336	356	469	3350	1380	306	698	306	745
12	338	443	316	334	353	512	3500	1210	255	633	306	683
13	327	437	323	332	355	655	3860	1060	248	580	291	649
14	346	425	321	329	349	806	4280	914	238	551	289	646
15	353	413	318	330	350	967	4600	784	241	524	296	643
16	364	402	326	329	354	1160	4770	678	244	529	301	629
17	370	403	334	337	359	1280	4950	632	237	502	309	620
18	375	405	341	335	357	1380	5150	623	266	489	324	605
19	375	401	346	328	356	1480	5310	661	323	465	324	598
20	376	400	351	327	360	1580	5400	685	381	428	336	715
21	384	398	355	328	371	1680	5480	700	401	404	337	818
22	412	377	350	327	375	1760	5550	680	386	390	362	860
23	438	378	351	329	383	1820	5500	647	362	377	379	876
24	458	384	354	328	400	1860	5370	568	338	346	393	879
25	472	384	355	327	414	1830	5180	520	315	323	400	960
26	470	385	356	328	417	1800	5040	476	316	313	390	1010
27	465	397	357	334	420	1800	4820	426	330	306	551	1050
28	456	399	354	332	429	1890	4560	385	533	288	825	1080
29	438	362	354	337	---	2190	4360	358	716	276	940	1110
30	433	346	354	344	---	2600	4120	327	830	275	1040	1180
31	440	---	353	349	---	2970	---	386	---	297	1130	---
TOTAL	11528	12598	10505	10311	10255	37075	129990	40380	10508	18368	13199	27544
MEAN	372	420	339	333	366	1196	4333	1303	350	593	426	918
MAX	472	483	357	349	429	2970	5550	3860	830	1020	1130	1300
MIN	266	346	316	327	342	440	3280	306	237	275	289	598
CFSM	.47	.53	.43	.42	.46	1.51	5.49	1.65	.44	.75	.54	1.16
IN.	.54	.59	.49	.49	.48	1.75	6.12	1.90	.49	.86	.62	1.30

CAL YR 1976 TOTAL 292697 MEAN 800 MAX 5330 MIN 220 CFSM 1.01 IN 13.78
WTR YR 1977 TOTAL 332261 MEAN 910 MAX 5550 MIN 237 CFSM 1.15 IN 15.65

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1973 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to current year.
WATER TEMPERATURES: October 1974 to current year.

INSTRUMENTATION.--Water quality monitor since October 1975.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument. In addition to the water-quality monitor record, monthly samples are collected as a cross-section sample at cableway 40 ft (12 m) downstream from gage or by wading 300 ft (91 m) downstream.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1976 and 1977), 238 micromhos Jan. 24, 1977; minimum (water year 1976), 34 micromhos Apr. 17, 18, 1976.
WATER TEMPERATURES (water years 1976 and 1977): Maximum, 26.5°C May 21, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPEATURES: Maximum, 26.5°C May 21; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UM-MF (COL./ 100 ML)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)
OCT												
04...	1500	278	191	7.7	12.0	9.4	89	45	--	--	95	8
27...	1500	910	179	7.3	3.0	12.1	92	25	84	13	88	12
DEC												
01...	1300	351	185	7.3	.0	12.0	85	815	81	30	91	13
JAN												
04...	1430	330	176	7.0	.0	8.8	62	30	82	84	90	10
FEB												
03...	1230	344	190	7.1	.0	7.2	50	260	45	49	88	9
MAR												
03...	1100	456	175	7.2	.0	9.2	64	83	81	81	85	9
29...	1330	2250	120	6.6	.5	8.2	60	40	82	84	53	22
MAY												
03...	1230	3300	83	6.7	12.0	8.0	76	68	--	--	41	6
JUN												
07...	1535	337	170	7.5	18.0	7.8	84	23	11	22	89	10
JUL												
20...	0830	434	155	7.3	24.0	6.3	76	710	85	180	84	17
AUG												
09...	1300	334	190	7.7	21.0	7.9	89	280	48	20	99	17
SEP												
13...	1330	644	152	6.9	15.0	6.7	67	180	89	72	81	20

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
OCT												
04...	26	7.4	1.9	.1	.8	106	0	87	3.4	10	1.8	.1
27...	24	6.7	1.8	.1	.8	92	0	75	7.4	16	1.7	.1
DEC												
01...	25	7.0	1.8	.1	.9	96	0	79	7.7	17	2.2	.1
JAN												
04...	25	6.8	1.6	.1	.8	98	0	80	16	18	2.6	.1
FEB												
03...	24	6.8	1.9	.1	.8	96	0	79	12	13	2.3	.1
MAR												
03...	24	6.0	2.1	.1	.9	92	0	75	9.3	17	4.3	.1
29...	16	3.2	1.3	.1	1.0	38	0	31	15	26	1.8	.1
MAY												
03...	11	3.2	.9	.1	.9	42	0	34	13	14	2.1	.1
JUN												
07...	25	6.4	1.9	.1	.8	96	0	79	4.9	14	2.4	.0
JUL												
20...	24	5.8	1.9	.1	.6	82	0	67	6.6	11	1.9	.0
AUG												
09...	28	7.1	2.0	.1	.8	100	0	82	3.2	14	2.2	.0
SEP												
13...	23	5.7	1.7	.1	1.0	74	0	61	15	16	2.3	.0

B--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	SUS-PENDED SEDI-MENT (MG/L)	SUS-PENDED SEDI-MENT DIS-CHARGE (T/DAY)	SUS. SED. SIEVE DIAM. % FINER THAN .062 MM
OCT											
04...	6.5	116	107	87.1	.03	.28	1.2	.03	5	3.8	100
27...	6.8	107	103	263	.09	.32	1.4	.06	8	20	100
DEC											
01...	8.2	116	110	110	.14	.39	1.7	.03	5	4.7	100
JAN											
04...	10	120	113	107	.19	.39	1.7	.05	6	5.3	100
FEB											
03...	9.9	117	106	109	.20	1.1	4.9	.03	1	.93	100
MAR											
03...	10	121	110	149	.31	.81	3.6	.03	0	.00	100
29...	6.7	115	75	699	.35	.95	4.2	.01	6	36	100
MAY											
03...	2.5	--	55	--	.01	.63	2.8	.01	9	80	100
JUN											
07...	5.7	117	104	106	.03	.53	2.3	.03	4	3.6	100
JUL											
20...	7.3	132	94	155	.05	.82	3.6	.01	5	5.9	100
AUG											
09...	7.1	135	111	122	.01	.50	2.2	.03	2	1.8	100
SEP											
13...	8.6	128	95	223	.05	.88	3.9	.03	4	7.0	100

DATE	TIME	TOTAL ARSENIC (AS) (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	TOTAL CAD-MIUM (CD) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	TOTAL CHRO-MIUM (CR) (UG/L)	DIS-SOLVED CHRO-MIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	TOTAL IRON (FE) (UG/L)
OCT												
04...	1500	0	0	--	1	<10	<10	0	0	10	10	270
JAN												
04...	1430	1	0	1	2	10	<10	0	0	0	0	380
MAR												
29...	1330	0	0	1	1	<10	<10	1	1	0	0	380
JUL												
20...	0830	2	0	0	0	10	1	0	0	3	0	1000

DATE	DIS-SOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	TOTAL MAN-GANESE (MN) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	TOTAL SELE-NIUM (SE) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	TOTAL ZINC (ZN) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	TOTAL ORGANIC CARBON (C) (MG/L)
OCT												
04...	90	8	4	30	10	<.5	<.5	0	0	10	10	5.9
JAN												
04...	270	5	2	--	30	<.5	<.5	0	0	--	10	7.5
MAR												
29...	290	7	6	50	40	<.5	<.5	1	0	--	20	--
JUL												
20...	730	9	5	60	20	.0	.0	0	0	20	10	6.1

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	TOTAL ALDRIN (UG/L)	ALDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ATRAZINE (UG/L)	ATRAZINE IN BOTTOM MATERIAL (UG/KG DRY SOLIDS)	TOTAL CHLORDANE (UG/L)	CHLORDANE IN BOTTOM MATERIAL (UG/KG)	TOTAL DDD (UG/L)	TOTAL DDE (UG/L)	TOTAL DDT (UG/L)	DDT IN BOTTOM MATERIAL (UG/KG)	TOTAL DIAZINON (UG/L)
FEB												
03...	1230	ND	--	ND	--	ND	--	ND	ND	ND	--	ND
MAY												
03...	1230	ND	ND	ND	ND	ND	0	ND	ND	ND	ND	--
AUG												
09...	1300	ND	--	ND	--	ND	--	ND	ND	ND	--	ND

DATE	DIAZINON IN BOTTOM MATERIAL (UG/KG)	TOTAL DIELDRIN (UG/L)	DIELDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ENDRIN (UG/L)	ENDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ETHION (UG/L)	ETHION IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR (UG/L)	HEPTACHLOR IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR EPOXIDE (UG/L)	HEPTACHLOR EPOXIDE IN BOTTOM MATERIAL (UG/KG)	TOTAL LINDANE (UG/L)
FEB												
03...	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND
MAY												
03...	ND	ND	ND	ND	ND	--	ND	ND	ND	ND	ND	ND
AUG												
09...	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND

DATE	LINDANE IN BOTTOM MATERIAL (UG/KG)	TOTAL MALATHION (UG/L)	MALATHION IN BOTTOM MATERIAL (UG/KG)	TOTAL METHOXYCHLOR (UG/L)	METHOXYCHLOR IN BOTTOM MATERIAL (UG/KG)	TOTAL METHYL PARATHION (UG/L)	METHYL PARATHION IN BOTTOM MATERIAL (UG/KG)	TOTAL METHYL TRITHION (UG/L)	METHYL TRITHION IN BOTTOM MATERIAL (UG/KG)	TOTAL PARATHION (UG/L)	PARATHION IN BOTTOM MATERIAL (UG/KG)	SIMAZINE TOTAL COULSON COND. (UG/L)
FEB												
03...	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND
MAY												
03...	ND	--	ND	ND	ND	--	ND	--	ND	--	ND	ND
AUG												
09...	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND

DATE	SIMAZINE IN BOTTOM MATERIAL (UG/KG DRY SOLIDS)	TOTAL TOXAPHENE (UG/L)	TOXAPHENE IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	TRITHION IN BOTTOM MATERIAL (UG/KG)	TOTAL 2,4-D (UG/L)	2,4-D IN BOTTOM MATERIAL (UG/KG)	TOTAL 2,4,5-T (UG/L)	2,4,5-T IN BOTTOM MATERIAL (UG/KG)	TOTAL SILVEX (UG/L)	SILVEX IN BOTTOM MATERIAL (UG/KG)
FEB											
03...	--	ND	--	ND	--	ND	--	ND	--	ND	--
MAY											
03...	ND	ND	ND	--	ND	ND	ND	ND	ND	ND	ND
AUG											
09...	--	ND	--	ND	--	ND	--	ND	--	ND	--

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

PERIPHYTON

DATE	LENGTH OF EXPOSURE (DAYS)	BIOMASS CHLOROPHYLL RATIO PERIPHYTON (UNITS)	CHLOR-A PERIPHYTON CHRONOGRAPHIC FLUOROM (MG/M2)	CHLOR-B PERIPHYTON CHRONOGRAPHIC FLUOROM (MG/M2)
OCT				
27...	24	2246	--	--
FEB				
03...	30	34830	--	--
MAY				
03...	35	8800	.000	.000
AUG				
09...	20	6043	.091	.052

ND--NOT DETECTED

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	OCT 27,76	DEC 1,76	JAN 4,77	FEB 3,77	MAR 3,77
TIME	1500	1300	1430	1230	1100
TOTAL CELLS/ML	48	12	42	160	26
DIVERSITY: DIVISION	0.9	0.8	0.3	0.7	0.5
.CLASS	0.9	0.8	0.3	0.7	0.5
..ORDER	1.3	1.5	1.1	0.7	1.1
...FAMILY	2.3	2.0	2.6	1.1	2.2
....GENUS	2.3	2.0	2.6	1.1	2.2

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	*	0	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	3	6	*	0	--	-
....CHLORELLA	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	--	-	--	-	--	-
....TETRASTRUM	--	-	--	-	--	-	--	-	--	-
..TETRASPORALES										
...PALMELLACEAE										
....GLOEOCYSTIS	--	-	3#	25	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-	3	13
...PHACOTACEAE										
....PHACOTUS	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	4	9	3#	25	--	-	--	-	3	13
....MELOSIRA	--	-	--	-	11#	25	*	0	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	*	0	--	-	6	4	--	-
....COCCONEIS	13#	27	*	0	3	6	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	*	0
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...EUNOTIACEAE										
....EUNOTIA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....SYNEDRA	4	9	3#	25	5	13	--	-	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	4	9	--	-	11#	25	*	0	--	-
...MERIDIONACEAE										
....MERIDION	--	-	--	-	--	-	15	9	3	13
...NAVICULACEAE										
....NAVICULA	4	9	*	0	5	13	3	2	10#	38
...NITZSCHIACEAE										
....NITZSCHIA	--	-	3#	25	5	13	9	6	7#	25
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-	--	-
...MALLOMONADACEAE										
....MALLOMONAS	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	OCT 27,76		DEC 1,76		JAN 4,77		FEB 3,77		MAR 3,77	
TIME	1500		1300		1430		1230		1100	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCOCCALES										
...CHROCOCCACEAE										
....ANACYSTIS	18#	36	--	-	--	-	--	-	--	-
..HORMOGONALES										
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	--	-	--	-	120#	79	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	--	-	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..GYMNODINIALES										
...GYMNODINIACEAE										
....GYMNODINIUM	--	-	--	-	--	-	--	-	--	-
..PERIDINIALES										
...PERIDINIACEAE										
....PERIDINIUM	--	-	--	-	--	-	--	-	--	-

DATE	MAY 3,77	JUN 7,77	JUL 20,77	AUG 9,77	SEP 13,77
TIME	1230	1535	0830	1300	1330
TOTAL CELLS/ML	230	10000	380	1700	840
DIVERSITY: DIVISION	0.5	1.7	1.1	1.9	0.7
.CLASS	1.4	1.8	1.1	2.1	0.7
..ORDER	2.0	1.9	1.2	2.7	1.2
...FAMILY	2.9	2.3	2.1	3.3	1.4
....GENUS	2.9	2.4	2.4	3.5	1.4

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	6	2	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	41	2	--	-
....MICRACTINIUM	--	-	--	-	--	-	200	11	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	280	3	--	-	16	1	--	-
....CHLORELLA	16	7	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	26	7	340#	20	--	-
....KIRCHNERIELLA	--	-	--	-	150#	41	*	0	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	--	-	100#	27	--	-	--	-
....SCENEDESMUS	--	-	560	6	--	-	--	-	70	8
....TETRASTRUM	--	-	--	-	--	-	33	2	--	-
..TETRASPORALES										
...PALMELLACEAE										
....GLOEOCYSTIS	--	-	--	-	--	-	140	8	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	94	1	--	-	--	-	--	-
....CHLAMYDOMONAS	3	1	190	2	--	-	--	-	--	-
...PHACOTACEAE										
....PHACOTUS	--	-	--	-	--	-	*	0	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAY 3,77 1230		JUN 7,77 1535		JUL 20,77 0830		AUG 9,77 1300		SEP 13,77 1330	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	75#	33	470	5	--	-	240	14	--	-
....MELOSIRA	--	-	--	-	--	-	--	-	630#	75
....STEPHANODISCUS	--	-	--	-	13	3	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-	35	4
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	*	0	--	-	6	2	--	-	--	-
...EUNOTIACEAE										
....EUNOTIA	13	6	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....SYNEDRA	21	9	280	3	39	10	16	1	18	2
...GOMPHONEMATACEAE										
....GOMPHONEMA	3	1	--	-	--	-	--	-	--	-
...MERIDIONACEAE										
....MERIDION	3	1	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	*	0	--	-	--	-	--	-	18	2
...NITZSCHIACEAE										
....NITZSCHIA	13	6	--	-	--	-	120	7	35	4
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	*	0	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	23	10	--	-	--	-	*	0	--	-
...MALLOMONADACEAE										
....MALLOMONAS	49#	21	94	1	--	-	41	2	--	-
...OCHROMONADACEAE										
....DINOBRYON	8	3	94	1	--	-	*	0	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCOCCALES										
...CHROCOCCACEAE										
....ANACYSTIS	--	-	3300#	33	--	-	200	11	--	-
..HORMOGONALES										
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	3900#	39	--	-	190	11	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	5	2	750	7	--	-	33	2	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	6	2	--	-	--	-
....TRACHELOMONAS	--	-	--	-	13	3	*	0	35	4
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..GYMNODINIALES										
...GYMNODINIACEAE										
....GYMNODINIUM	--	-	--	-	--	-	33	2	--	-
..PERIDINIALES										
...PERIDINIACEAE										
....PERIDINIUM	--	-	--	-	13	3	25	1	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	166	162	164	---	---	---	172	162	167
2	---	---	---	162	160	161	---	---	---	171	169	170
3	---	---	---	160	158	159	---	---	---	170	162	167
4	195	188	195	158	157	158	---	---	---	175	165	171
5	195	192	193	157	156	157	---	---	---	175	170	173
6	194	191	192	157	155	156	---	---	---	173	164	169
7	193	191	191	156	154	155	---	---	---	172	167	170
8	192	189	190	155	153	154	---	---	---	172	165	169
9	191	190	190	154	152	153	---	---	---	175	163	169
10	190	189	189	156	153	154	---	---	---	177	169	174
11	190	188	189	157	155	156	---	---	---	186	169	179
12	188	187	188	158	157	157	---	---	---	181	165	175
13	191	188	190	158	157	158	188	185	186	189	162	174
14	194	191	192	158	157	157	185	182	183	191	175	183
15	194	193	193	---	157	177	184	178	180	182	163	169
16	---	---	---	---	---	---	178	169	172	177	163	171
17	---	---	---	---	---	---	169	162	165	194	171	182
18	---	---	---	---	---	---	164	160	162	200	174	188
19	---	---	---	---	---	---	165	162	163	220	197	206
20	---	---	---	---	---	---	163	153	157	224	195	209
21	---	---	---	---	---	---	155	152	153	222	201	209
22	---	---	---	---	---	---	157	153	155	208	189	199
23	---	---	---	---	---	---	157	154	155	224	203	210
24	---	---	---	---	---	---	161	154	157	238	224	231
25	---	---	---	---	---	---	161	158	160	236	209	226
26	---	---	---	---	---	---	159	155	158	226	200	213
27	170	169	170	---	---	---	158	153	155	203	190	197
28	170	165	168	---	---	---	159	155	157	217	186	199
29	167	164	165	---	---	---	160	152	155	193	174	182
30	169	165	167	---	---	---	157	150	154	182	176	179
31	168	166	167	---	---	---	162	155	158	190	182	185
MONTH	195	164	184	166	152	158	188	150	162	238	162	186

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	202	189	195	186	181	183	97	92		---	---	---
2	195	185	189	188	185	---	112	96		---	---	---
3	198	189	191	189	170	---	103	87		176	64	72
4	199	183	191	193	177	---	92	79		83	63	---
5	185	167	176	---	---	---	79	62		84	76	80
6	193	166	179	---	---	---	79	67		90	75	83
7	192	167	176	178	161	---	78	64		96	82	---
8	190	177	181	182	167	---	81	66		---	88	---
9	203	180	191	187	147	---	84	70		---	99	---
10	198	177	187	176	153	---	77	72		---	100	---
11	214	199	205	185	157	---	77	69		---	104	---
12	216	178	196	179	162	---	76	70		---	106	---
13	219	195	205	176	158	---	76	64		---	105	---
14	198	187	192	186	159	---	64	59		---	110	---
15	188	180	183	178	150	---	61	58		---	109	---
16	187	174	180	156	145	---	59	57		---	122	---
17	196	177	185	157	146	---	58	57		---	124	---
18	199	194	196	157	140	---	57	55		---	119	---
19	195	180	188	154	137	---	56	54		---	119	---
20	194	176	184	152	134	---	56	54		---	112	---
21	186	175	181	147	134	---	57	55		---	144	---
22	198	186	190	145	133	---	56	54		---	144	---
23	178	165	171	149	131	---	57	55		152	137	---
24	190	169	175	150	143	---	60	57		148	135	---
25	193	181	187	151	139	---	60	---		154	136	---
26	193	160	189	157	137	---	---	---		145	138	---
27	192	184	188	150	141	---	---	---		146	140	---
28	188	180	184	154	140	---	---	---		148	142	---
29	---	---	---	140	123	---	---	---		152	143	---
30	---	---	---	123	100	---	---	---		150	144	---
31	---	---	---	100	93	---	---	---		160	146	---
MONTH	219	160	187	193	93	183	112	54		174	63	78

04049500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	169	152	---				---	---	---	147	143	146
2	159	152	155				---	---	---	141	131	134
3	158	152	---				---	---	---	137	131	134
4	166	158	161				---	---	---	142	136	139
5	167	158	162				---	---	---	143	141	142
6	169	161	164				---	---	---	143	142	142
7	167	162	163				---	---	---	145	142	143
8	---	---	---				---	---	0	146	144	145
9	---	---	---				194	193	194	148	146	147
10	---	---	---				193	191	192	148	147	148
11	---	---	---				191	190	191	150	148	149
12	---	---	---				189	188	188	150	148	149
13	---	---	---				190	188	189	151	149	150
14	---	---	---				190	188	189	152	150	151
15	---	---	---				190	189	190	152	152	152
16	---	---	---				190	189	190	153	152	152
17	---	---	---				192	189	191	153	152	152
18	---	---	---				190	187	188	154	152	153
19	---	---	---				188	186	187	155	153	154
20	---	---	---				188	187	188	153	150	151
21	---	---	---				187	185	186	150	141	146
22	---	---	---				187	184	186	140	131	135
23	---	---	---				187	186	186	133	130	131
24	---	---	---				188	185	187	136	133	135
25	---	---	---				189	186	187	135	132	134
26	---	---	---				188	186	188	133	127	130
27	---	---	---				187	182	185	128	124	125
28	---	---	---				188	175	183	127	124	125
29	---	---	---				173	131	146	127	126	126
30	---	---	---				139	131	135	---	---	---
31	---	---	---				148	139	145	---	---	---
MONTH	169	152	161				194	131	175	155	124	142

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	3.0	2.5	2.5	.0	.0	.0	.0	.0	.0
2	---	---	---	3.0	2.5	3.0	.0	.0	.0	.0	.0	.0
3	---	---	---	3.0	2.5	3.0	.0	.0	.0	.0	.0	.0
4	12.5	11.5	11.5	3.0	2.5	3.0	.0	.0	.0	.0	.0	.0
5	12.0	11.5	11.5	3.0	2.5	3.0	.0	.0	.0	.5	.0	.0
6	11.5	11.0	11.0	3.0	2.5	2.5	.5	.5	.5	.0	.0	.0
7	11.0	10.5	10.5	2.5	1.5	2.0	.5	.5	.5	.0	.0	.0
8	10.5	10.0	10.5	1.5	1.0	1.0	.5	.5	.5	.0	.0	.0
9	10.5	10.0	10.5	1.0	.5	1.0	.0	.0	.0	.0	.0	.0
10	10.5	10.0	10.0	.5	.0	.5	.5	.0	.0	.0	.0	.0
11	10.0	9.0	9.5	.5	.0	.0	.5	.0	.0	.0	.0	.0
12	10.0	9.5	9.5	.0	.0	.0	.5	.0	.5	.0	.0	.0
13	10.0	9.0	9.5	.0	.0	.0	.5	.5	.5	.0	.0	.0
14	9.0	8.5	8.5	.0	.0	.0	1.5	.5	1.0	.5	.0	.0
15	8.5	8.5	8.5	.0	.0	.0	2.0	1.5	1.5	.0	.0	.0
16	---	---	---	.5	.0	.0	2.0	1.5	2.0	.0	.0	.0
17	---	---	---	.5	.0	.0	2.0	.5	1.5	.0	.0	.0
18	---	---	---	.5	.0	.0	1.5	.5	.5	.0	.0	.0
19	---	---	---	.5	.0	.0	1.5	.5	1.0	.0	.0	.0
20	---	---	---	.0	.0	.0	1.5	.0	.5	.0	.0	.0
21	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
22	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
23	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
24	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
25	---	---	---	.0	.0	.0	.0	.0	.0	.0	.0	.0
26	---	---	---	.5	.0	.0	.0	.0	.0	.0	.0	.0
27	3.5	---	---	.5	.0	.0	.0	.0	.0	.0	.0	.0
28	2.5	2.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	3.0	2.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
30	3.0	2.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
31	3.5	2.5	3.0	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	12.5	2.0	8.5	3.0	.0	.5	2.0	.0	.5	.5	.0	.0

STREAMS TRIBUTARY TO LAKE SUPERIOR

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.5	.0	.0	1.0	.0		---	---	---
2	.0	.0	.0	1.0	.5	---	2.5	.0		---	---	---
3	.0	.0	.0	1.0	.0	---	.0	.0		13.0	12.0	12.5
4	.0	.0	.0	2.0	1.5	---	.0	.0		13.0	11.5	12.5
5	.0	.0	.0	---	---	---	.0	.0		12.5	11.5	12.0
6	.0	.0	.0	---	---	---	1.5	.0		12.0	11.0	11.5
7	.0	.0	.0	2.5	2.0	---	.5	.0		12.5	10.5	11.5
8	.0	.0	.0	3.0	2.5	---	1.0	.0		12.0	11.5	12.0
9	.0	.0	.0	3.0	1.0	---	1.0	.0		12.0	11.0	11.5
10	.0	.0	.0	3.0	2.0	---	.0	.0		12.0	10.5	11.5
11	.0	.0	.0	3.5	1.0	---	.5	.0		11.5	10.5	---
12	.0	.0	.0	1.5	1.0	---	2.0	.0		13.5	---	---
13	.0	.0	.0	2.5	1.0	---	3.5	2.0		15.0	13.0	14.5
14	.0	.0	.0	2.5	1.0	---	3.5	2.5		16.5	14.5	15.5
15	.0	.0	.0	2.5	1.0	---	4.0	3.0		17.5	15.0	16.5
16	.0	.0	.0	2.5	1.5	---	4.5	4.0		20.0	17.5	---
17	.0	.0	.0	3.0	2.0	---	5.5	5.0		20.0	19.0	---
18	.0	.0	.0	2.5	1.5	---	6.0	5.5		23.5	19.5	---
19	.0	.0	.0	2.5	1.5	---	6.5	6.0		25.0	21.0	---
20	.0	.0	.0	2.5	1.5	---	7.5	6.5		26.0	22.0	---
21	.0	.0	.0	2.0	1.5	---	8.0	7.5		26.5	22.0	---
22	.0	.0	.0	2.0	1.0	---	8.5	7.5		26.0	22.0	---
23	.0	.0	.0	2.0	1.0	---	9.0	8.5		25.0	19.0	---
24	.0	.0	.0	2.0	1.5	---	9.5	9.0		22.5	18.5	---
25	.0	.0	.0	1.5	1.0	---	9.5	---		23.5	19.5	---
26	.0	.0	.0	1.5	1.0	---	---	---		22.0	19.0	---
27	.0	.0	.0	1.0	.5	---	---	---		22.0	19.0	---
28	.5	.0	.0	1.5	.5	---	---	---		22.5	19.0	---
29	---	---	---	1.0	.0	---	---	---		22.0	19.5	---
30	---	---	---	1.0	.0	---	---	---		21.0	19.0	---
31	---	---	---	1.0	.5	---	---	---		20.5	19.0	---
MONTH	.5	.0	.0	3.5	.0	.0	9.5	.0		26.5	10.5	13.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	20.5	19.5	---	---	---	---	23.0	20.5	22.0	19.5	18.0	19.0
2	21.0	19.5	---	---	---	---	22.0	21.0	21.5	18.0	17.5	17.5
3	20.5	18.5	19.5	---	---	---	21.5	20.5	21.0	18.0	17.5	17.5
4	20.0	18.5	19.0	---	---	---	21.5	20.0	20.5	17.5	17.0	17.5
5	20.0	18.0	18.5	---	---	---	21.5	20.5	21.0	17.0	16.0	16.5
6	19.5	17.0	18.0	---	---	---	22.0	20.5	21.0	16.0	15.0	15.5
7	22.0	16.0	19.0	---	---	---	22.0	21.0	21.5	15.0	14.0	14.5
8	---	---	---	---	---	---	22.5	21.0	21.5	14.5	13.0	14.0
9	---	---	---	---	---	---	22.0	20.5	21.5	14.5	13.0	14.0
10	---	---	---	---	---	---	21.5	21.0	21.0	14.5	13.5	14.0
11	---	---	---	---	---	---	21.0	20.5	21.0	14.0	13.0	13.5
12	---	---	---	---	---	---	21.0	20.0	20.5	16.0	13.0	14.0
13	---	---	---	---	---	---	21.5	20.0	20.5	15.5	13.5	15.0
14	---	---	---	---	---	---	21.0	19.5	20.5	15.0	13.0	13.5
15	---	---	---	---	---	---	20.5	19.5	20.0	14.5	13.0	13.5
16	---	---	---	---	---	---	20.0	19.0	19.5	15.0	13.5	14.5
17	---	---	---	---	---	---	19.0	18.5	19.0	14.0	13.0	13.5
18	---	---	---	---	---	---	18.5	18.0	18.5	14.0	12.5	13.0
19	---	---	---	25.5	---	---	18.5	17.5	18.0	13.5	12.5	13.0
20	---	---	---	26.0	24.5	25.0	18.5	17.0	17.5	13.0	12.5	12.5
21	---	---	---	25.5	24.5	25.0	18.0	17.5	17.5	13.0	12.5	12.5
22	---	---	---	25.0	24.5	24.5	18.0	17.0	17.5	13.0	12.0	12.5
23	---	---	---	25.0	24.0	24.5	18.0	16.5	17.0	13.5	11.5	12.5
24	---	---	---	25.0	24.0	24.0	18.0	16.5	17.0	13.0	11.0	12.0
25	---	---	---	25.0	24.0	24.0	17.5	16.0	16.5	12.5	11.0	12.0
26	---	---	---	24.5	23.0	23.5	17.0	16.0	16.5	12.5	11.0	12.0
27	---	---	---	24.0	22.5	23.0	17.5	16.0	17.0	12.5	11.0	12.0
28	---	---	---	23.0	22.0	22.5	19.0	17.0	18.0	13.0	11.0	12.0
29	---	---	---	22.5	21.5	22.0	19.0	18.0	18.5	13.0	11.0	12.0
30	---	---	---	22.5	21.5	22.0	20.0	18.5	19.5	---	---	---
31	---	---	---	23.0	21.0	22.0	19.5	19.5	19.5	---	---	---
MONTH	22.0	16.0	19.0	26.0	21.0	23.5	23.0	16.0	19.5	19.5	11.0	14.0

04045560 ST. MARYS RIVER ABOVE SAULT STE. MARIE, MI
(National stream-quality accounting network and radiochemical station)

LOCATION.--Lat 46°29'29", long 84°25'17", in NW¼ sec.10, T.47 N., R.1 W., Chippewa County, Hydrologic Unit 04020300, at Sault Ste. Marie municipal raw-water intake at Big Point, 1 mi (1.6 km) west of Sault Ste. Marie.

DRAINAGE AREA.--80,900 mi² (210,000 km²), approximately.

PERIOD OF RECORD.--Water year 1970 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: March 1974 to current year.
WATER TEMPERATURES: March 1974 to current year.

REMARKS.--Primary sampling point is at raw-water tap in Sault Ste. Marie municipal water plant at Big Point. Intake is 1,500 ft (457 m) out at a depth of 30 ft (9 m), 10 ft (3 m) above the bottom of the channel. Discharge estimates obtained from U.S. Army Corps of Engineers, Sault Ste. Marie.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 97 micromhos Jan. 13, 17, 20, 1977; minimum daily, 76 micromhos Apr. 24, 1975.
WATER TEMPERATURES: Maximum daily, 20.5°C Aug. 22-28, 1976, July 28, 1977; minimum daily, 0.0°C Mar. 14, 15, 1974.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--A specific conductance of 100 micromhos was observed Jan. 29, 1974.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 97 micromhos Jan. 13, 17, 20; minimum daily, 88 micromhos Oct. 1-4, 7, 8.
WATER TEMPERATURES: Maximum daily, 20.5°C July 28; minimum daily, 1.0°C on several days during December and January.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UM-MF (COL./100 ML)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)
OCT												
05...	0900	F65000	94	7.3	15.0	10.0	95	11	--	--	44	0
26...	1515	F61500	93	7.1	10.0	13.1	100	<1	<1	B2	44	0
NOV												
30...	1130	F63000	96	7.7	3.5	13.8	97	<1	<1	<1	44	0
JAN												
05...	1400	F58000	99	7.2	1.5	13.5	94	B2	<1	<1	44	0
FEB												
02...	1345	F59000	98	7.3	2.0	13.5	94	<1	<1	<1	44	0
MAR												
02...	1215	F60000	89	7.5	2.0	13.0	91	<1	<1	<1	47	0
30...	1040	F60000	92	7.3	2.5	--	--	B2	<1	<1	42	0
APR												
26...	1445	F60500	91	7.6	4.5	9.9	105	B3	<1	<1	44	0
JUN												
08...	1215	F61000	92	7.4	10.5	10.4	107	10	<1	<1	47	2
JUL												
20...	1430	F61000	92	7.5	22.0	9.8	121	14	7	B6	46	3
AUG												
10...	0930	F60000	95	7.6	19.5	8.8	94	20	B3	B3	44	2
SEP												
14...	0830	F65000	95	7.3	19.0	9.7	94	B5	B1	9	44	1

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
OCT												
05...	13	2.8	1.1	.1	.5	60	0	49	4.8	2.1	1.4	.1
26...	13	2.8	1.0	.1	.5	56	0	46	7.1	2.0	1.4	.1
NOV												
30...	14	2.2	1.1	.1	.6	58	0	48	1.9	3.2	2.5	.1
JAN												
05...	13	2.7	.9	.1	.5	56	0	46	5.7	4.8	2.0	.1
FEB												
02...	13	2.9	1.2	.1	.5	56	0	46	4.5	1.9	2.0	.1
MAR												
02...	14	2.8	1.3	.1	.5	58	0	48	2.9	2.3	1.4	.1
30...	14	1.8	1.1	.1	.5	54	0	44	4.3	--	1.2	.1
APR												
26...	13	2.8	1.2	.1	.5	54	0	44	2.2	1.8	--	.1
JUN												
08...	14	2.8	1.3	.1	.5	54	0	44	3.4	3.7	1.8	.0
JUL												
20...	14	2.7	1.5	.1	.6	52	0	43	2.6	2.3	1.4	.0
AUG												
10...	13	2.8	1.3	.1	.7	51	0	42	2.0	2.9	1.6	.0
SEP												
14...	13	2.7	1.2	.1	.7	52	0	43	4.2	2.6	1.0	.0

E--ESTIMATED VALUE

B--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)
OCT								
05...	2.1	54	53	F9480	.23	.31	1.4	.02
26...	2.1	50	51	F8300	.24	.29	1.3	.04
NOV								
30...	2.3	50	55	F8510	.29	.37	1.6	.03
JAN								
05...	2.3	56	54	F8470	.30	.48	2.1	.02
FEB								
02...	2.1	52	51	F8280	.30	.98	4.3	.02
MAR								
02...	2.2	51	53	F8260	.30	.51	2.3	.02
30...	2.2	63	--F	10200	.31	.41	1.8	.01
APR								
26...	2.0	56	--	F9150	.33	.63	2.8	.04
JUN								
08...	2.3	52	53	F8560	.26	.39	1.7	.01
JUL								
20...	2.2	62	50F	10200	.29	.47	2.1	.00
AUG								
10...	2.0	58	49	F9400	.24	.45	2.0	.00
SEP								
14...	1.9	47	49	F7610	.24	.40	1.8	.01

DATE	TIME	TOTAL ARSENIC (AS) (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	TOTAL CAD-MIUM (CD) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	TOTAL CHRO-MIUM (CR) (UG/L)	DIS-SOLVED CHRO-MIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	TOTAL IRON (FE) (UG/L)
OCT												
05...	0900	0	0	1	1	<10	<10	0	0	10	0	40
JAN												
05...	1400	1	1	1	1	<10	<10	0	0	0	0	40
MAR												
30...	1040	0	0	1	0	<10	<10	1	0	0	0	40
APR												
26...	1445	1	0	2	1	<10	<10	0	0	0	0	70
JUL												
20...	1430	0	0	2	2	<10	0	0	0	5	5	50

DATE	DIS-SOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	TOTAL MAN-GANESE (MN) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	TOTAL SELE-NIUM (SE) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	TOTAL ZINC (ZN) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	TOTAL ORGANIC CARBON (C) (MG/L)
OCT												
05...	0	5	5	10	0	<.5	<.5	0	0	40	30	4.5
JAN												
05...	40	9	9	--	10	.6	.6	0	0	--	40	8.3
MAR												
30...	0	5	3	0	0	<.5	<.5	1	0	30	30	1.3
APR												
26...	10	5	4	0	0	<.5	<.5	1	1	50	50	1.3
JUL												
20...	0	--	11	0	0	.0	.0	0	0	80	60	7.0

DATE	TIME	TOTAL FILT-RABLE RESIDUE (MG/L)	TOTAL NON-FILT-RABLE RESIDUE (MG/L)	DIS-SOLVED GROSS ALPHA AS U-NAT. (UG/L)	SUS-PENDED GROSS ALPHA AS U-NAT. (UG/L)	DIS-SOLVED GROSS BETA AS CS-137 (PC/L)	SUS-PENDED GROSS BETA AS CS-137 (PC/L)	DIS-SOLVED GROSS BETA AS SR90 /Y90 (PC/L)	SUS-PENDED GROSS BETA AS SR90 /Y90 (PC/L)	DIS-SOLVED RA-226 (RADON METHOD) (PC/L)	DIS-SOLVED URANIUM (U) (UG/L)
JAN											
05...	1400	55	<1	<.7	<.4	2.3	<.4	1.8	<.4	.05	.04

DATE	LENGTH OF EXPO-SURE (DAYS)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)
OCT				
26...	21	984	--	--
JUN				
08...	43	42000	.015	.000
AUG				
10...	21	14360	.011	.000

E--ESTIMATED VALUE

04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	OCT 5,76		OCT 26,76		NOV 30,76		JAN 5,77		FEB 2,77	
TIME	0900		1515		1130		1400		1345	
TOTAL CELLS/ML	1800		230		280		200		12	
DIVERSITY: DIVISION	0.9		0.9		0.7		1.1		0.0	
.CLASS	1.0		1.5		0.7		1.1		0.0	
..ORDER	1.0		1.7		1.3		1.7		0.0	
...FAMILY	1.0		2.4		2.3		1.8		0.0	
....GENUS	1.6		2.9		2.6		2.0		0.0	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	--	-	--	-	--	-
....CLOSTERIOPSIS	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	11	5	--	-	10	5	--	-
....QUADRIGULA	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
....WESTELLA	--	-	*	0	--	-	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	170	9	45#	19	45#	16	--	-	--	-
....SCENEDESMUS	--	-	11	5	--	-	5	2	*	0
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	11	5	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....COSMARIUM	--	-	--	-	--	-	--	-	--	-
....SPONDYLOSIUM	--	-	--	-	3	1	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	21	1	3	1	42	15	25	13	--	-
....STEPHANODISCUS	--	-	--	-	--	-	3	1	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	11	4	*	0	--	-
....COCCONEIS	--	-	--	-	3	1	*	0	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	--	-
....CYMBELLA	--	-	6	2	--	-	3	1	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	14	6	20	7	8	4	*	0
....FRAGILARIA	--	-	78#	34	120#	43	10	5	--	-
....SYNEDRA	--	-	--	-	3	1	--	-	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	3	1	3	1	--	-	--	-
...NAVICULACEAE										
....NAVICULA	31	2	3	1	6	2	--	-	--	-
....NEIDIUM	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	3	1	11	4	*	0	--	-
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	--	-
...TABELLARIACEAE										
....TABELLARIA	--	-	6	2	14	5	*	0	*	0
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	140	7	39#	17	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....ANACYSTIS	310#	17	*	0	--	-	120#	61	--	-
..HORMOGONALES										
...OSCILLATORIACEAE	--	-	--	-	--	-	--	-	12#	100
....OSCILLATORIA	--	-	--	-	--	-	15	7	--	-
....PHORMIDIUM	--	-	--	-	--	-	--	-	--	-
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....GOMPHOSPHAERIA	1100#	63	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	3	1	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

IDENTIFICATION OF PHYTOPLANKTON

DATE	MAR 2,77	JUN 8,77	JUL 20,77	AUG 10,77	SEP 14,77
TIME	1215	1215	1430	0930	0830
TOTAL CELLS/ML	9	1100	140	580	220
DIVERSITY: DIVISION	0.0	1.4	0.8	0.5	1.7
.CLASS	0.0	1.7	1.6	0.7	1.9
..ORDER	0.0	2.2	1.8	0.8	2.1
...FAMILY	0.9	3.3	2.2	0.9	2.6
....GENUS	0.9	3.5	2.2	1.0	2.6

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	26	2	--	-	--	-	--	-
....CLOSTERIOPSIS	--	-	9	1	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
....QUADRIGULA	--	-	--	-	--	-	43	7	--	-
....TETRAEDRON	--	-	--	-	--	-	5	1	--	-
....WESTELLA	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	--	-	--	-	--	-	53#	24
....SCENEDESMUS	--	-	120	10	--	-	11	2	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	--	-	11	2	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....COSMARIUM	--	-	9	1	--	-	--	-	--	-
....SPONDYLOSIUM	--	-	9	1	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	--	-	26	2	15	10	16	3	9	4
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	94	8	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	43	4	--	-	--	-	--	-
....CYMBELLA	--	-	26	2	5	3	--	-	4	2
...DIATOMACEAE										
....DIATOMA	--	-	9	1	5	3	--	-	4	2
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	--	-	--	-	4	2
....FRAGILARIA	--	-	34	3	10	7	--	-	--	-
....SYNEDRA	--	-	77	7	--	-	--	-	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	6#	67	--	-	--	-	--	-	4	2
...NAVICULACEAE										
....NAVICULA	--	-	100	9	--	-	--	-	4	2
....NEIDIUM	--	-	9	1	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	86	7	--	-	5	1	--	-
...SURIRELLACEAE										
....SURIRELLA	--	-	9	1	--	-	--	-	--	-
...TABELLARIACEAE										
....TABELLARIA	3#	33	--	-	10	7	--	-	31	14
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	60	5	59#	41	490#	85	18	8
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCOCCALES										
...CHROCOCCACEAE										
....ANACYSTIS	--	-	300#	26	--	-	--	-	84#	38
..HORMOGONALES										
...OSCILLATORIACEAE	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	100	9	--	-	--	-	--	-
....PHORMIMIDIUM	--	-	--	-	39#	28	--	-	--	-
..CHROCOCCALES										
...CHROCOCCACEAE										
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	4	2
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	88	92	93	96	96	94	93	93	93	93	93	93
2	88	93	93	96	96	94	93	93	92	92	93	92
3	88	92	93	95	95	95	93	92	92	93	93	93
4	88	93	93	95	95	93	93	92	93	93	92	93
5	89	92	93	96	95	93	93	91	92	92	93	93
6	89	93	93	95	95	93	92	92	93	93	93	92
7	88	91	93	96	95	93	93	92	93	94	92	92
8	88	92	93	95	95	94	92	92	93	94	93	92
9	90	92	94	95	95	93	93	92	92	93	93	92
10	90	92	93	95	95	93	92	92	93	93	92	93
11	90	91	93	96	95	93	92	93	93	93	92	93
12	90	93	93	96	95	93	92	93	92	94	92	93
13	91	93	93	97	95	93	93	93	93	93	93	93
14	91	93	94	96	95	94	92	93	93	92	92	93
15	91	92	94	96	95	94	92	92	93	93	92	93
16	91	92	94	96	95	94	93	93	94	93	92	93
17	92	92	94	97	94	94	91	92	92	93	92	93
18	92	92	93	96	93	93	90	92	93	92	93	93
19	92	93	93	96	93	93	90	93	93	92	93	93
20	92	92	93	97	93	94	90	93	91	92	93	93
21	93	92	93	96	94	94	91	93	93	92	93	93
22	93	92	93	96	94	94	92	93	92	92	93	93
23	93	92	94	96	93	94	92	92	93	92	93	93
24	93	91	93	96	94	94	92	92	93	93	93	93
25	92	92	93	96	93	94	92	93	93	92	93	93
26	92	93	93	95	93	93	91	92	93	92	93	93
27	93	93	94	96	94	94	90	92	93	92	93	93
28	92	93	94	95	94	94	91	92	92	92	93	93
29	92	92	96	95	---	94	93	93	92	92	93	93
30	93	92	96	96	---	92	93	93	93	93	93	93
31	93	---	96	95	---	93	---	93	---	93	93	---

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15.5	9.0	2.5	1.0	2.0	2.0	2.0	5.5	10.5	14.0	20.0	18.5
2	15.0	9.0	2.5	1.0	2.0	2.0	2.0	5.5	10.0	14.0	19.5	18.5
3	15.0	9.5	1.5	1.5	2.0	2.0	2.0	6.0	10.0	14.5	19.0	18.0
4	15.0	9.0	1.5	1.5	2.0	2.0	2.0	6.5	10.5	15.0	19.0	18.0
5	15.0	8.0	2.0	1.5	2.0	2.0	2.0	6.0	10.5	15.0	19.5	18.0
6	14.5	8.5	2.5	2.0	2.0	2.0	2.0	6.0	11.5	16.0	19.5	18.0
7	13.0	7.0	2.0	2.5	2.0	2.0	2.0	6.0	12.0	15.5	19.5	17.5
8	13.0	7.0	1.5	2.5	2.0	2.0	2.0	6.0	11.5	15.5	19.5	17.5
9	13.0	7.0	1.0	2.5	2.0	2.0	2.0	6.0	10.5	15.0	19.5	17.5
10	13.0	6.5	1.5	2.5	2.0	2.0	2.0	6.0	11.5	15.5	19.5	17.5
11	13.0	6.5	1.5	2.0	2.0	2.0	2.5	6.5	13.0	16.0	19.0	16.5
12	13.0	6.0	1.5	2.0	2.0	2.0	2.5	6.5	13.0	16.0	19.0	17.0
13	13.5	6.0	1.5	2.0	2.0	2.0	2.5	7.5	13.5	17.0	19.0	17.0
14	13.0	6.0	1.5	1.5	2.0	2.0	2.5	7.5	13.5	16.5	19.0	16.5
15	12.5	6.0	1.5	1.5	2.0	2.0	3.0	7.5	13.5	15.5	19.0	17.0
16	11.5	6.5	1.5	1.5	2.0	2.0	2.5	8.0	13.5	16.0	19.0	17.0
17	11.0	6.5	1.5	1.5	2.0	2.0	3.5	8.5	13.5	17.0	18.5	17.0
18	10.5	6.5	1.5	1.5	2.0	2.0	4.0	9.0	13.0	17.0	18.0	17.0
19	10.5	6.5	1.5	1.5	2.0	2.0	4.0	9.5	13.0	17.5	18.0	17.0
20	11.0	6.5	1.5	1.5	2.0	2.0	4.0	9.5	12.5	19.5	18.0	16.5
21	11.0	6.0	1.5	1.5	2.0	2.0	3.5	10.0	13.0	19.0	18.0	16.5
22	10.5	5.0	1.5	1.5	2.0	2.0	4.5	10.0	13.0	19.0	18.0	16.5
23	9.5	5.0	1.5	1.5	2.0	2.0	5.0	10.0	14.0	19.0	18.0	16.5
24	9.5	5.0	1.5	2.0	2.0	2.0	4.5	10.0	14.5	19.5	18.0	16.5
25	10.0	4.5	1.5	2.0	2.0	2.0	4.5	10.0	14.5	20.0	18.0	16.0
26	9.5	4.0	1.5	2.0	2.0	2.0	4.5	10.5	14.5	20.0	18.5	15.5
27	9.5	5.0	1.5	2.0	2.0	2.0	4.0	11.5	15.0	20.0	19.0	15.5
28	9.5	4.5	1.5	2.0	2.0	2.0	3.5	11.5	14.5	20.5	20.0	15.5
29	9.5	4.0	1.0	2.0	---	2.5	4.0	11.0	14.5	20.0	20.0	15.5
30	9.5	3.5	1.0	2.0	---	2.5	5.0	10.5	14.0	20.0	20.0	15.5
31	9.5	---	1.0	2.0	---	2.5	---	10.5	---	20.0	18.5	---

04046000 BLACK RIVER NEAR GARNET, MI

LOCATION.--Lat 46°07'05", long 85°21'55", in SE¼ sec.13, T.43 N., R.9 W., Mackinac County, Hydrologic Unit 04060107, on right bank 10 ft (3 m) upstream from highway bridge, 15 ft (5 m) downstream from Peters Creek entering from right, 3.5 mi (5.6 km) upstream from Lake Michigan, and 4 mi (6 km) southwest of Garnet.

DRAINAGE AREA.--28 mi² (73 km²), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1951 to current year.

REVISED RECORDS.--WSP 1707: 1959.

GAGE.--Water-stage recorder. Datum of gage is 629.7 ft (191.93 m) above mean sea level.

REMARKS.--Water-discharge records fair.

AVERAGE DISCHARGE.--26 years, 29.0 ft³/s (0.821 m³/s), 14.06 in/yr (357 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 860 ft³/s (24.4 m³/s) May 7, 1960, gage height, 8.55 ft (2.606 m), from rating curve extended above 400 ft³/s (11.3 m³/s); minimum, 4.9 ft³/s (0.14 m³/s) Mar. 11, 1956, gage height, 2.10 ft (0.640 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 120 ft³/s (3.40 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 1	1500	*209	5.92	*4.73	1.442	Apr. 13	2200	189	5.35	4.55	1.387

Minimum discharge, 6.0 ft³/s (0.17 m³/s) Oct. 4; minimum gage height, 2.21 ft (0.674 m) Jan. 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.8	6.4	7.7	7.1	7.1	8.4	171	47	13	48	13	63
2	6.7	6.4	7.7	7.1	7.1	8.3	145	46	12	47	12	46
3	6.6	6.4	7.8	7.1	7.1	8.3	131	40	12	45	11	38
4	6.4	6.9	7.9	7.1	7.1	8.4	119	37	12	58	10	40
5	7.9	6.8	7.8	7.1	7.1	8.3	95	43	12	47	10	46
6	7.5	6.7	8.1	7.1	7.1	8.3	89	48	13	38	9.8	37
7	6.6	6.6	8.1	7.1	7.1	8.2	79	41	12	31	9.5	37
8	6.9	6.8	8.1	7.1	7.1	8.2	72	37	12	32	9.4	33
9	6.8	7.0	8.2	7.1	7.1	8.4	67	33	11	31	9.1	32
10	6.7	6.9	8.0	7.1	7.1	8.7	75	30	11	25	9.1	31
11	6.7	6.7	7.8	7.1	7.1	9.2	107	28	11	21	9.0	28
12	6.7	7.0	7.9	7.1	7.3	14	148	26	11	19	8.6	34
13	6.7	7.0	7.8	7.1	7.4	28	178	25	11	17	9.2	35
14	6.9	6.9	7.9	7.1	7.3	28	172	23	11	16	9.2	38
15	6.9	6.9	7.8	7.1	7.4	31	158	21	11	16	8.7	29
16	6.7	7.1	7.9	7.1	7.4	36	142	20	11	14	11	30
17	6.7	7.2	7.9	7.1	7.3	34	146	19	11	14	10	29
18	6.6	7.3	7.8	7.1	7.3	33	162	21	13	13	9.4	30
19	7.0	7.3	7.9	7.1	7.1	35	150	20	14	12	9.3	34
20	7.3	7.5	7.6	7.1	7.1	38	139	20	12	11	9.0	37
21	7.4	7.5	7.7	7.1	7.2	40	147	19	11	11	9.8	30
22	7.4	7.4	7.6	7.1	7.1	41	163	18	11	10	10	31
23	7.2	7.4	7.6	7.1	7.2	41	132	16	11	9.9	11	33
24	6.7	7.6	7.6	7.1	9.2	44	111	15	11	9.8	11	35
25	6.7	7.6	7.6	7.1	9.3	38	94	15	11	9.5	11	66
26	6.6	7.7	7.6	7.0	9.0	37	79	14	10	9.0	11	46
27	6.6	7.7	7.6	7.0	8.7	50	70	14	34	8.8	51	43
28	6.3	7.7	7.4	7.0	8.6	76	65	13	53	9.0	67	39
29	6.2	7.7	7.4	7.0	---	125	56	13	58	9.2	53	49
30	6.3	7.6	7.4	7.0	---	184	51	12	46	8.9	38	51
31	6.5	---	7.2	7.2	---	186	---	12	---	13	51	---
TOTAL	211.0	213.7	240.4	219.7	210.0	1231.7	3513	786	492	663.1	520.1	1150
MEAN	6.81	7.12	7.75	7.09	7.50	39.7	117	25.4	16.4	21.4	16.8	38.3
MAX	7.9	7.7	8.2	7.2	9.3	186	178	48	58	58	67	66
MIN	6.2	6.4	7.2	7.0	7.1	8.2	51	12	10	8.8	8.6	28
CFSM	.24	.25	.28	.25	.27	1.42	4.18	.91	.59	.76	.60	1.37
IN.	.28	.28	.32	.29	.28	1.64	4.67	1.04	.65	.88	.69	1.53

CAL YR 1976 TOTAL 8922.1 MEAN 24.4 MAX 228 MIN 6.2 CFSM .87 IN 11.85
WTR YR 1977 TOTAL 9450.7 MEAN 25.9 MAX 186 MIN 6.2 CFSM .93 IN 12.56

04046000 BLACK RIVER NEAR GARNET, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1951 to September 1975, October 1976 to current year.

INSTRUMENTATION.--Temperature recorder since Oct. 1, 1951.

REMARKS.--Intermittent ice cover during winter period. Temperature recorder clock stopped Mar. 26-30 (range in temperature 0.5 to 2.0°C).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES (Water years 1952-75, 1977): Maximum, 19.5°C July 21, 22, 1952; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 18.0°C July 5-7, 15, 17, 19; minimum, 0.0°C Dec. 8-14, 31.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	9.5	7.5	4.5	3.5	0.5	0.5	1.0	0.5	1.0	0.5	1.0	0.5
2	9.5	8.0	4.5	3.5	0.5	0.5	1.0	1.0	1.0	1.0	1.5	0.5
3	9.0	8.0	4.5	4.0	0.5	0.5	1.0	1.0	1.0	1.0	1.5	0.5
4	9.5	8.5	4.0	4.0	0.5	0.5	1.0	1.0	1.0	1.0	0.5	0.5
5	9.5	8.5	4.0	4.0	1.0	0.5	1.5	1.0	1.0	1.0	1.5	0.5
6	8.5	7.5	4.0	3.5	1.0	1.0	1.5	1.0	1.0	1.0	2.0	1.5
7	7.5	7.0	3.5	2.5	1.0	1.0	1.0	1.0	1.0	1.0	2.0	1.0
8	7.0	6.5	2.5	1.5	0.5	0.0	1.0	1.0	1.0	1.0	2.5	1.0
9	7.5	7.0	2.5	1.5	0.0	0.0	1.0	1.0	1.5	1.0	2.5	1.5
10	7.0	6.0	2.5	2.5	0.0	0.0	1.0	1.0	2.0	1.5	3.0	1.5
11	7.0	5.5	2.5	2.0	0.0	0.0	1.0	1.0	2.0	2.0	2.5	1.5
12	8.5	7.0	2.5	2.0	0.0	0.0	1.0	1.0	2.0	2.0	2.0	1.5
13	7.0	7.0	2.5	2.5	0.0	0.0	1.0	0.5	2.0	1.0	1.5	1.0
14	8.0	6.0	2.5	2.0	0.5	0.0	0.5	0.5	1.0	1.0	1.0	1.0
15	6.0	6.0	2.0	1.5	1.0	0.5	0.5	0.5	1.0	0.5	1.5	1.0
16	6.0	5.5	1.5	1.5	1.0	1.0	0.5	0.5	0.5	0.5	1.0	1.0
17	5.5	5.0	2.5	1.5	1.5	1.0	1.0	0.5	0.5	0.5	1.0	1.0
18	5.0	5.0	2.5	2.5	1.5	1.0	1.0	1.0	1.5	0.5	1.5	1.0
19	5.0	5.0	2.5	2.5	1.5	1.0	1.5	1.0	1.5	1.0	1.0	1.0
20	5.0	5.0	2.5	2.5	1.5	0.5	1.5	1.5	1.0	1.0	1.5	1.0
21	5.0	5.0	2.5	2.0	0.5	0.5	1.5	1.5	1.0	1.0	1.5	1.0
22	5.0	4.5	2.0	2.0	0.5	0.5	1.5	1.5	2.0	1.0	1.5	1.0
23	4.0	3.5	2.0	2.0	0.5	0.5	1.5	1.5	1.5	0.5	1.0	0.5
24	4.0	3.5	2.0	1.5	0.5	0.5	1.5	1.5	1.0	0.5	0.5	0.5
25	4.0	4.0	1.5	1.5	1.0	0.5	1.5	1.5	1.0	1.0	0.5	0.5
26	4.0	3.5	2.5	1.5	0.5	0.5	1.5	1.0	1.5	1.0	---	---
27	3.5	3.5	2.5	2.5	0.5	0.5	1.0	1.0	1.0	1.0	---	---
28	3.5	3.0	2.5	1.0	0.5	0.5	1.0	0.5	1.0	0.5	---	---
29	4.5	3.5	1.0	0.5	0.5	0.5	0.5	0.5	---	---	---	---
30	4.5	4.0	0.5	0.5	0.5	0.5	0.5	0.5	---	---	---	---
31	4.5	4.5	---	---	0.5	0.0	0.5	0.5	---	---	1.0	0.5
MONTH	9.5	3.0	4.5	0.5	1.5	0.0	1.5	0.5	2.0	0.5	3.0	0.5

04046000 BLACK RIVER NEAR GARNET, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	0.5	0.5	9.0	7.5	11.0	10.0	14.0	13.5	15.0	13.0	17.0	15.5
2	0.5	0.5	9.0	6.5	12.5	9.0	14.5	12.5	14.5	12.5	16.5	15.5
3	1.5	0.5	9.0	6.5	12.0	8.0	14.0	13.5	13.5	11.0	15.5	13.5
4	1.5	0.5	9.0	7.0	12.5	10.0	15.5	13.5	12.5	12.0	14.5	13.5
5	0.5	0.5	9.0	8.0	12.0	10.0	18.0	15.5	13.5	12.5	14.0	13.5
6	1.0	0.5	9.5	7.5	13.5	11.0	18.0	17.5	14.5	11.5	13.5	13.0
7	1.5	1.0	9.5	6.5	12.5	9.0	18.0	16.5	15.0	12.0	13.5	13.0
8	1.5	1.0	9.5	7.0	12.5	9.0	17.5	15.5	15.0	12.5	13.0	12.0
9	2.0	1.0	10.0	6.5	12.5	8.5	17.0	15.5	13.0	11.0	15.0	13.0
10	3.5	1.5	10.5	7.0	12.0	8.0	16.0	13.5	12.5	12.0	14.5	12.5
11	3.5	2.0	11.5	7.5	11.0	10.0	16.5	14.5	13.5	11.5	12.5	10.5
12	3.5	2.5	11.5	9.0	13.0	10.0	17.0	15.5	13.5	10.5	12.5	12.0
13	3.5	3.0	13.0	10.0	11.5	9.0	17.0	15.0	13.0	12.5	12.5	12.5
14	4.5	2.0	13.5	10.0	13.5	9.0	16.5	13.5	13.5	10.5	12.0	11.0
15	4.5	3.0	13.0	10.0	13.5	10.5	18.0	15.5	12.5	10.5	12.0	10.5
16	5.0	3.0	14.5	11.0	12.0	11.0	17.5	15.0	12.0	11.5	12.0	12.0
17	5.5	4.5	14.5	11.5	14.0	11.0	18.0	15.5	13.0	11.5	12.5	12.0
18	5.5	5.5	15.0	12.0	13.0	11.5	16.5	14.5	12.0	10.0	13.5	12.5
19	7.5	5.5	15.0	12.0	13.0	12.0	18.0	14.5	12.5	10.5	13.5	12.5
20	7.5	2.5	16.0	12.5	15.0	11.5	17.5	15.5	11.0	9.5	12.5	12.0
21	7.5	7.0	14.5	12.5	14.5	11.0	17.5	14.5	12.5	11.0	13.0	11.5
22	8.5	6.5	15.5	12.5	15.0	10.5	16.5	13.0	12.5	10.5	11.5	11.0
23	8.5	7.0	15.5	12.0	12.5	11.0	16.0	13.0	12.0	10.0	11.5	11.0
24	8.5	7.5	14.5	11.0	14.5	11.5	15.5	13.5	12.5	10.0	11.5	11.0
25	8.5	6.5	15.5	11.5	16.0	12.0	16.0	13.0	12.0	9.5	12.0	11.0
26	8.5	7.0	14.5	11.0	16.0	12.0	15.0	11.5	12.0	11.5	12.0	12.0
27	8.5	7.5	14.5	10.5	14.5	13.0	14.0	11.5	16.5	12.0	12.0	11.5
28	7.5	6.0	14.5	10.5	15.5	14.5	13.0	12.0	17.0	16.5	11.5	10.5
29	7.5	5.5	13.5	10.5	15.5	15.0	13.5	11.5	17.0	15.5	10.5	10.5
30	9.0	7.0	13.0	9.0	15.0	13.5	13.5	11.5	16.0	14.5	10.5	10.0
31	---	---	12.0	10.0	---	---	16.0	12.5	15.5	15.0	---	---
MONTH	9.0	0.5	16.0	6.5	16.0	8.0	18.0	11.5	17.0	9.5	17.0	10.0

04056500 MANISTIQUE RIVER NEAR MANISTIQUE, MI

LOCATION.--Lat 46°01'50", long 86°09'40", in SE¼ sec.15, T.42 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, on left bank 1.0 mi (1.6 km) downstream from West Branch, 6.0 mi (9.7 km) northeast of Manistique, and at mile 19.5 (31.4 km).

DRAINAGE AREA.--1,100 mi² (2,849 km²), approximately.

PERIOD OF RECORD.--March 1938 to current year.

REVISED RECORDS.--WSP 1387: 1940-42(M), 1943, 1945. WSP 1627, 1727: 1938, 1939.

GAGE.--Water-stage recorder. Altitude of gage is 608 ft (185.3 m) from river-profile map (nearest ft). Prior to July 15, 1939, non-recording gage at site 1,600 ft (487.7 m) upstream at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Since July 1948, slight regulation by dam on outlet of Manistique Lake. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 1,411 ft³/s (39.96 m³/s), 17.42 in/yr (442 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,900 ft³/s (479 m³/s) May 11, 1960, gage height, 12.85 ft (3.917 m); minimum, 288 ft³/s (8.16 m³/s) Oct. 4, 1948; minimum gage height, 1.01 ft (0.308 m) Aug. 23, 1941.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 7,610 ft³/s (216 m³/s) Apr. 16, gage height, 10.90 ft (3.322 m); maximum gage height, 11.29 ft (3.441 m) Apr. 2, backwater from ice; minimum discharge, 376 ft³/s (10.6 m³/s) Oct. 4, gage height, 2.02 ft (0.616 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	391	625	500	500	480	630	4900	3730	966	1320	813	940
2	390	628	490	490	480	650	5400	3480	846	1360	850	1050
3	387	632	480	480	480	670	5300	3200	805	1350	837	1060
4	381	641	470	480	480	680	5000	2980	793	1340	795	1040
5	403	653	470	470	490	680	4800	2810	786	1330	764	1030
6	433	679	460	470	490	670	4700	2710	794	1290	750	1030
7	454	696	460	470	490	660	4600	2590	820	1210	731	1010
8	470	674	460	470	490	650	4600	2470	850	1150	718	1010
9	461	659	450	470	490	660	4600	2340	832	1120	699	988
10	442	674	450	470	480	680	4700	2200	765	1050	683	948
11	424	661	450	470	480	720	5000	2080	754	970	678	888
12	416	653	450	470	480	820	5130	1990	747	905	668	892
13	418	670	450	470	480	1000	5430	1890	728	872	672	940
14	421	654	450	470	480	1200	6150	1800	706	911	672	960
15	424	616	450	470	490	1400	7190	1710	684	1070	666	952
16	435	591	460	470	490	1600	7540	1630	664	1120	683	924
17	441	580	470	470	490	1800	7460	1560	648	1100	722	892
18	446	580	480	460	500	2000	7240	1510	657	1040	732	868
19	459	580	480	460	500	2200	7020	1530	693	984	722	860
20	466	570	490	460	510	2400	6780	1560	736	936	704	880
21	485	570	490	460	520	2500	6590	1550	737	922	694	972
22	528	560	490	460	530	2700	6560	1510	700	905	683	1070
23	551	560	500	460	540	2800	6670	1430	663	863	686	1180
24	576	550	500	460	560	2700	6650	1350	640	826	694	1270
25	637	550	500	460	570	2700	6300	1280	632	800	690	1400
26	647	540	510	460	580	2700	5790	1220	616	767	697	1540
27	640	540	510	460	600	2600	5330	1160	640	741	739	1580
28	631	540	520	470	620	3200	4910	1120	819	724	816	1600
29	621	530	520	470	---	3500	4420	1070	1030	720	840	1640
30	616	510	510	470	---	3900	4050	1040	1220	712	828	1660
31	621	---	500	480	---	4300	---	1010	---	742	816	---
TOTAL	15115	18166	14870	14550	14270	55370	170810	59510	22971	31150	22742	33074
MEAN	488	606	480	469	510	1786	5694	1920	766	1005	734	1102
MAX	647	696	520	500	620	4300	7540	3730	1220	1360	850	1660
MIN	381	510	450	460	480	630	4050	1010	616	712	666	860
CFSM	.44	.55	.44	.43	.46	1.62	5.18	1.75	.70	.91	.67	1.00
IN.	.51	.61	.50	.49	.48	1.87	5.78	2.01	.78	1.05	.77	1.12

CAL YR 1976 TOTAL 495913 MEAN 1355 MAX 9100 MIN 356 CFSM 1.23 IN 16.77
WTR YR 1977 TOTAL 472598 MEAN 1295 MAX 7540 MIN 381 CFSM 1.18 IN 15.98

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°58'18", long 86°14'35", in SE¼ SE¼ sec.1, T.41 N., R.16 W., Schoolcraft County, Hydrologic Unit 04060106, at Wyman State Nursery, 0.7 mi (1.1 km) downstream from Indian River, 0.8 mi (1.3 km) upstream from U.S. Highway 2 and 1.8 mi (2.9 km) upstream from mouth.

DRAINAGE AREA.--1,445 mi² (3,743 km²), approximately.

PERIOD OF RECORD.--Water year 1976 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1975 to current year.
WATER TEMPERATURES: October 1975 to current year.

INSTRUMENTATION.--Water quality monitor since October 1975.

REMARKS.--Monthly samples are collected as a cross-section sample at the Wyman State Nursery site or at railroad bridge 1,200 ft (366 m) downstream. Intermittent ice cover during winter period. Prior to Oct. 1, 1975, water quality data collected at station 04057005 Manistique River at Manistique, MI, 1.5 mi (2.4 km) downstream.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 254 micromhos Nov. 24, 1977; minimum daily, 77 micromhos Apr. 12, 1976.
WATER TEMPERATURES: Maximum, 25.5°C July 20, 21, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 254 micromhos Nov. 24; minimum, not recorded.
WATER TEMPERATURES: Maximum, 25.5°C July 20, 21; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UM-MF (COL./ 100 ML)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)
NOV												
03...	1050	1070	204	7.5	4.5	12.4	98	32	22	88	110	33
23...	1300	848	238	7.8	.5	13.6	97	36	82	86	110	31
DEC												
14...	0915	700	247	7.6	.0	10.5	73	120	83	83	120	22
JAN												
17...	1315	513	239	7.5	.0	10.1	71	41	82	81	110	21
FEB												
10...	1030	656	239	7.2	.0	10.7	75	83	84	84	120	30
MAR												
10...	1330	573	218	7.1	1.0	10.2	74	36	9	8	110	25
MAY												
09...	1130	2790	153	7.4	11.0	10.2	94	810	82	81	88	23
JUN												
02...	1200	1100	209	7.7	16.0	8.2	84	57	17	11	100	30
16...	1145	400	182	7.8	19.0	8.6	93	57	83	83	89	17
JUL												
27...	1315	624	200	7.7	22.0	8.0	92	8410	83	--	97	22
AUG												
18...	1200	1060	194	7.6	17.5	--	--	70	--	--	110	36
SEP												
08...	1245	1260	172	7.4	16.0	8.9	91	190	10	12	94	27

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
NOV												
03...	31	6.7	1.3	.1	.7	94	0	77	4.8	29	1.1	.1
23...	34	6.8	1.5	.1	.8	100	0	82	2.5	40	1.9	.1
DEC												
14...	38	7.1	1.5	.1	.7	120	0	98	4.8	41	1.8	.1
JAN												
17...	34	7.2	1.5	.1	.8	114	0	94	5.8	31	1.9	.1
FEB												
10...	35	7.8	1.3	.1	.7	110	0	90	11	33	2.2	.1
MAR												
10...	32	6.9	1.3	.1	.7	102	0	84	13	29	3.1	.1
MAY												
09...	24	4.9	1.0	.0	.8	70	0	57	4.5	25	1.5	.0
JUN												
02...	31	6.5	1.4	.1	.7	90	0	74	2.9	30	1.7	.0
16...	26	5.8	1.3	.1	.6	88	0	72	2.2	24	2.4	.0
JUL												
27...	28	6.6	1.3	.1	.7	92	0	75	2.9	24	2.1	.1
AUG												
18...	32	6.5	1.4	.1	.8	86	0	71	3.5	27	1.5	.1
SEP												
08...	28	5.9	1.4	.1	.7	82	0	67	5.2	27	2.2	.0

B--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	SUS-PENDED SEDI-MENT (MG/L)	SUS-PENDED SEDI-MENT DIS-CHARGE (T/DAY)	SUS. SED. SIEVE DIAM. % FINER THAN .062 MM
NOV											
03...	6.7	126	123	364	.10	.45	2.0	.02	3	8.7	100
23...	6.5	146	141	334	.09	.32	1.4	.02	2	4.6	100
DEC											
14...	7.0	168	156	318	.10	.30	1.3	.03	1	1.9	100
JAN											
17...	7.3	138	140	191	.12	.37	1.6	.02	4	5.5	100
FEB											
10...	7.5	147	142	260	.14	.41	1.8	.02	1	1.8	100
MAR											
10...	7.8	145	131	224	.22	.57	2.5	.02	2	3.1	100
MAY											
09...	3.9	117	96	881	.05	.57	2.5	.05	4	30	100
JUN											
02...	4.9	125	121	371	.06	.28	1.2	.01	3	8.9	100
16...	5.2	123	109	133	.07	.41	1.8	.00	3	3.2	100
JUL											
27...	6.3	141	115	238	.08	.47	2.1	.02	4	6.7	100
AUG											
18...	6.1	133	118	381	.09	.39	1.7	.02	4	11	100
SEP											
08...	6.4	130	112	442	.06	.49	2.2	.01	8	27	100

DATE	TIME	TOTAL ARSENIC (AS) (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	TOTAL CAD-MIUM (CD) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	TOTAL CHRO-MIUM (CR) (UG/L)	DIS-SOLVED CHRO-MIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	TOTAL IRON (FE) (UG/L)
NOV												
03...	1050	0	0	0	0	<10	<10	3	0	10	0	630
JAN												
17...	1315	1	0	1	1	<10	<10	11	0	10	0	460
MAY												
09...	1130	1	1	0	0	<10	6	0	0	2	2	850
JUL												
27...	1315	2	0	0	0	<10	3	0	0	3	0	1100

DATE	DIS-SOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	TOTAL MAN-GANESE (MN) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	TOTAL SELE-NIUM (SE) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	TOTAL ZINC (ZN) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	TOTAL ORGANIC CARBON (C) (MG/L)
NOV												
03...	360	4	3	20	20	<.5	<.5	0	0	10	10	7.7
JAN												
17...	390	8	7	30	20	<.5	<.5	0	0	20	20	7.9
MAY												
09...	320	10	4	30	20	.0	.0	0	0	20	20	8.3
JUL												
27...	780	25	23	30	20	.0	.0	0	0	10	10	4.9

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

PERIPHYTON

DATE	LENGTH OF EXPO-SURE (DAYS)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)
NOV				
23...	20	77100	.000	.000
JUN				
02...	--	13140	.024	.000
AUG				
18...	22	31630	.092	.110

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 3,76 1050		NOV 23,76 1300		DEC 14,76 0915		JAN 17,77 1315		FEB 10,77 1030		MAY 9,77 1130	
TOTAL CELLS/ML	1400		2700		340		200		68		2700	
DIVERSITY: DIVISION	1.2		1.3		1.8		1.3		0.3		1.3	
.CLASS	1.2		1.5		1.8		1.6		0.3		1.6	
..ORDER	1.4		2.0		2.6		2.0		1.1		2.4	
...FAMILY	1.4		2.3		3.1		3.3		2.6		3.1	
....GENUS	1.9		2.6		3.3		3.4		2.8		0.0	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)												
.CHLOROPHYCEAE												
..CHLOROCOCCALES												
...CHARACIACEAE												
....SCHROEDERIA	--	-	*	0	--	-	--	-	--	-	--	-
...COELASTRACEAE												
....COELASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE												
....PEDIASTRUM	--	-	29	1	--	-	--	-	--	-	--	-
...MICRACTINIACEAE												
....GOLENKINIA	--	-	*	0	--	-	--	-	--	-	--	-
...OOCYSTACEAE												
....ANKISTRODESMUS	--	-	--	-	--	-	5	3	4	6	--	-
....CHODATELLA	--	-	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	270#	19	--	-	--	-	--	-	--	-	--	-
....FRANCEIA	--	-	*	0	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-	*	0
....OOCYSTIS	65	5	22	1	11	3	--	-	--	-	--	-
....SELENASTRUM	--	-	*	0	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	3	1	--	-	--	-	*	0
...SCENEDESMACEAE												
....CRUCIGENIA	--	-	88	3	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	11	3	13	7	--	-	100	4
....TETRADESMUS	--	-	15	1	--	-	--	-	--	-	--	-
..TETRASPORALES												
...COCCOMYXACEAE												
....ELAKATOTHRIX	--	-	29	1	--	-	--	-	--	-	--	-
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CARTERIA	--	-	*	0	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	33	2	15	1	19	6	--	-	--	-	110	4
....CHLOROGONIUM	--	-	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES												
...DESMIDIACEAE												
....COSMARIUM	--	-	--	-	--	-	--	-	--	-	--	-
....SPHAEROZOSMA	--	-	--	-	--	-	--	-	--	-	--	-
....SPONDYLOSIUM	--	-	--	-	--	-	--	-	--	-	--	-
....STAURASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
...UNKNOWN	--	-	--	-	--	-	--	-	--	-	38	1
..CHLOROCOCCALES												
...OOCYSTACEAE												
....GLOEOACTINIUM	200	14	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 3,76 1050		NOV 23,76 1300		DEC 14,76 0915		JAN 17,77 1315		FEB 10,77 1030		MAY 9,77 1130	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	11	1	66	2	22	6	5	3	11#	17	100	4
....MELOSIRA	--	-	*	0	14	4	15	8	8	11	730#	27
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-	*	0
...RHIZOSOLENIACEAE												
....RHIZOSOLENIA	--	-	*	0	--	-	--	-	--	-	*	0
..PENNALES												
...ACHNANTHACEAE												
....ACHNANTHES	--	-	52	2	3	1	10	5	--	-	50	2
....COCCONEIS	--	-	*	0	--	-	3	1	--	-	--	-
...CYMBELLACEAE												
....AMPHORA	--	-	--	-	3	1	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	3	1	8	4	4	6	3A	1
....RHOPALODIA	--	-	--	-	--	-	--	-	--	-	*	0
...DIATOMACEAE												
....DIATOMA	--	-	--	-	--	-	--	-	15#	22	--	-
...FRAGILARIACEAE												
....ASTERIONELLA	--	-	66	2	25	7	--	-	--	-	100	4
....FRAGILARIA	--	-	*	0	--	-	15	8	--	-	76	3
....SYNEDRA	11	1	--	-	--	-	3	1	4	6	25	1
...GOMPHONEMATACEAE												
....GOMPHONEMA	22	2	--	-	--	-	--	-	--	-	25	1
...NAVICULACEAE												
....NAVICULA	--	-	66	2	5	2	31#	16	11#	17	88	3
....NEIDIUM	--	-	--	-	--	-	--	-	--	-	--	-
....PINNULARIA	--	-	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE												
....NITZSCHIA	22	2	74	3	41	12	36#	18	11#	17	400	15
...SURIRELLACEAE												
....SURIRELLA	--	-	--	-	3	1	--	-	--	-	--	-
...TABELLARIACEAE												
....TABELLARIA	--	-	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...MALLOMONADACEAE												
....MALLOMONAS	--	-	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE												
....DINOBRYON	--	-	110	4	--	-	13	7	--	-	200	7
....OCHROMONAS	--	-	210	8	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROCOCCALES												
...CHROCOCCACEAE												
....AGMENELLUM	--	-	59	2	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	29	1	60#	18	--	-	--	-	--	-
..HORMOGONALES												
...OSCILLATORIACEAE												
....LYNGBYA	--	-	--	-	--	-	--	-	--	-	440#	16
....OSCILLATORIA	810#	56	140	5	87#	26	10	5	--	-	--	-
...RIVULARIACEAE												
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-	--	-
..CHROCOCCALES												
...CHROCOCCACEAE												
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)												
.CRYPTOPHYCEAE												
..CRYPTOMONIDALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	--	-	33	10	--	-	--	-	100	4
...CRYPTOMONODACEAE												
....CRYPTOMONAS	--	-	*	0	--	-	28	14	--	-	--	-
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....TRACHELOMONAS	--	-	15	1	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..PERIDINIALES												
...PERIDINIACEAE												
....PERIDINIUM					--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 2,77		JUN 16,77		JUL 27,77		AUG 18,77		SEP 8,77	
TIME	1200		1145		1315		1200		1245	
TOTAL CELLS/ML	18000		4300		6400		11000		5400	
DIVERSITY: DIVISION	0.6		1.0		0.8		1.1		0	
.CLASS	0.6		1.0		0.8		1.1		0.4	
..ORDER	0.7		1.5		1.0		1.5		0.7	
...FAMILY	0.7		1.6		1.2		1.6		0.7	
....GENUS	0.8		2.7		1.3		1.8		2.1	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	*	0	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	*	0	*	0	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	100	1	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	*	0	*	0	*	0	130	1	*	0
....CHODATELLA	--	-	*	0	*	0	--	-	--	-
....DICTYOSPHAERIUM	--	-	35	1	140	2	--	-	*	0
....FRANCEIA	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	*	0	70	2	63	1	*	0	*	0
....OOCYSTIS	*	0	78	2	110	2	260	2	*	0
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	370	9	*	0	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	--	-	--	-	620	6	--	-
....SCENEDESMUS	100	1	87	2	230	4	250	2	37	1
....TETRADESMUS	--	-	--	-	--	-	--	-	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	*	0	--	-	*	0	--	-	--	-
....CHLOROGONIUM	*	0	--	-	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....COSMARIUM	--	-	--	-	*	0	*	0	--	-
....SPHAEROZOSMA	--	-	*	0	--	-	--	-	--	-
....SPONDYLOSIUM	--	-	--	-	--	-	100	1	--	-
....STAURASTRUM	*	0	*	0	--	-	*	0	*	0
...UNKNOWN 211011103024000	--	-	--	-	--	-	--	-	--	-
..CHLOROCOCCALES										
...OOCYSTACEAE										
....GLOEOACTINIUM	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUN 2,77 1200		JUN 16,77 1145		JUL 27,77 1315		AUG 18,77 1200		SEP 8,77 1245	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	290	2	170	4	170	3	130	1	110	2
....MELOSIRA	390	2	35	1	--	-	560	5	80	1
....STEPHANODISCUS	*	0	*	0	--	-	*	0	--	-
...RHIZOSOLENIACEAE										
....RHIZOSOLENIA	*	0	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	*	0	*	0	36	1	78	1	--	-
....COCCONEIS	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	--	-
....CYMBELLA	--	-	*	0	--	-	--	-	--	-
....RHOPALODIA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	*	0	*	0	--	-	--	-	*	0
....FRAGILARIA	*	0	*	0	--	-	--	-	--	-
....SYNEDRA	*	0	35	1	110	2	*	0	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	*	0	--	-	--	-	*	0	--	-
...NAVICULACEAE										
....NAVICULA	*	0	*	0	36	1	*	0	--	-
....NEIDIUM	--	-	*	0	--	-	--	-	--	-
....PINNULARIA	--	-	--	-	*	0	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	190	1	52	1	--	-	91	1	43	1
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	--	-
...TABELLARIACEAE										
....TABELLARIA	*	0	*	0	--	-	--	-	*	0
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...MALLOMONADACEAE										
....MALLOMONAS	*	0	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....DINOBRYON	*	0	--	-	--	-	*	0	--	-
....OCHROMONAS	--	-	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCOCCALES										
...CHROCOCCACEAE										
....AGMENELLUM	--	-	140	3	--	-	--	-	1600#	30
....ANACYSTIS	16000#	90	1700#	40	5200#	82	7800#	72	1000#	19
..HORMOGONALES										
...OSCILLATORIACEAE										
....LYNGBYA	--	-	370	8	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	89	1	400	4	240	4
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	54	1	--	-	--	-
..CHROCOCCALES										
...CHROCOCCACEAE										
....GOMPHOSPHAERIA	--	-	1100#	25	--	-	--	-	2200#	40
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	210	1	--	-	--	-	*	0	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	*	0	--	-	--	-	--	-	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....TRACHELOMONAS	*	0	--	-	36	1	78	1	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...PERIDINIACEAE										
....PERIDINIUM	*	0	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C). WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	220	212	215	208	191	198	251	249	250	225	212	221
2	223	216	219	212	202	208	247	240	242	224	217	219
3	226	215	220	205	190	195	243	237	239	222	214	219
4	223	220	222	195	187	193	245	242	244	219	211	215
5	223	212	219	193	182	186	251	246	247	222	215	217
6	212	205	210	192	189	191	247	242	245	218	216	216
7	207	203	206	193	184	189	245	235	242	222	213	216
8	210	202	205	187	178	182	236	229	231	215	210	213
9	214	203	209	234	189	220	231	225	227	217	201	208
10	214	205	209	228	221	226	232	225	230	217	214	216
11	226	211	218	220	203	211	235	224	231	218	209	215
12	229	220	223	219	199	207	232	224	226	209	205	207
13	220	211	215	233	205	219	231	219	222	214	204	208
14	220	210	215	240	217	226	235	229	232	216	210	213
15	210	194	199	240	219	228	237	227	230	209	207	208
16	201	197	199	236	220	227	234	228	230	213	205	208
17	196	190	194	242	235	238	228	225	227	214	212	213
18	192	189	190	250	237	241	227	224	226	222	213	217
19	191	189	190	240	231	235	227	225	226	218	212	214
20	192	189	191	239	228	233	226	218	222	221	215	217
21	196	191	193	239	232	236	227	212	219	221	214	216
22	193	189	191	240	233	237	226	215	219	218	214	216
23	189	172	178	244	235	241	220	216	217	223	217	221
24	180	176	176	256	238	243	228	216	220	226	219	223
25	186	178	182	248	240	243	224	222	223	220	216	218
26	186	179	183	244	241	243	224	216	219	222	215	220
27	180	176	178	240	237	240	223	215	218	220	214	216
28	214	175	195	235	214	227	222	216	219	223	213	217
29	206	197	200	228	205	212	218	205	213	221	214	216
30	205	193	198	251	228	242	213	208	211	221	216	217
31	205	193	198	---	---	---	219	211	214	225	219	221
MONTH	229	172	201	256	178	221	251	205	228	226	201	216
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	222	218	220	218	202	210	---			144	---	---
2	224	219	221	217	203	210	---			150	---	---
3	227	224	225	217	206	211	150			149	138	---
4	227	225	226	216	205	210	---			158	144	149
5	227	221	224	217	211	214	---			160	152	154
6	223	218	221	214	210	212	---			165	153	159
7	229	220	224	214	208	210	---			162	144	154
8	229	224	227	221	209	216	---			162	152	158
9	231	226	229	215	206	209	---			177	145	159
10	236	230	234	217	206	212	---			168	153	162
11	237	229	232	213	210	211	---			173	163	167
12	236	230	234	211	198	207	---			182	170	175
13	234	227	230	206	193	198	---			182	176	179
14	231	223	226	193	180	188	---			183	175	178
15	229	216	222	180	176	179	---			186	177	182
16	225	215	219	177	168	173	---			191	182	188
17	224	210	219	168	166	167	---			194	187	191
18	227	217	222	171	147	158	---			202	192	196
19	224	211	218	167	160	164	---			199	192	195
20	219	211	214	165	157	161	---			200	194	197
21	220	209	217	159	151	155	---			197	192	194
22	229	219	223	151	147	149	---			200	191	194
23	222	206	214	155	143	---	---			200	191	194
24	228	220	224	142	138	---	---			204	194	199
25	228	220	223	---	---	---	---			221	201	210
26	227	213	218	---	---	---	---			223	202	213
27	218	212	213	---	---	---	---			227	208	217
28	218	208	212	---	---	---	---			226	210	218
29	---	---	---	---	---	---	---			220	212	216
30	---	---	---	---	---	---	136			231	218	224
31	---	---	---	154	---	---	---			233	220	227
MONTH	237	206	223	221	138	192	150			233	138	187

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	230	221	225	177	163	169	206	200	203	200	193	198
2	230	217	223	164	155	159	200	196	198	198	189	193
3	233	215	225	163	155	158	200	191	197	193	181	188
4	228	211	222	162	155	159	204	196	201	188	182	186
5	211	202	206	166	156	160	207	201	203	187	180	183
6	210	197	205	168	159	163	207	197	203	183	176	179
7	200	187	193	178	157	162	213	203	209	195	185	189
8	197	186	191	175	159	163	220	206	213	195	187	192
9	195	178	187	181	158	164	218	201	209	198	193	195
10	196	178	186	165	153	161	219	207	213	195	183	191
11	187	178	182	190	164	171	223	208	215	193	168	182
12	192	176	182	201	173	180	240	207	154	198	187	191
13	199	177	187	203	176	183	---	---	---	198	188	194
14	192	174	184	197	175	182	---	---	---	200	184	191
15	195	184	189	197	184	189	---	---	---	204	190	195
16	196	190	194	209	177	196	---	---	---	201	197	199
17	198	183	191	180	164	174	---	---	---	201	198	199
18	196	185	190	176	163	167	202	191	198	205	199	201
19	196	186	190	178	163	171	195	181	188	205	198	203
20	199	182	189	184	165	175	201	189	196	199	194	197
21	190	177	183	176	165	171	202	196	199	208	194	200
22	191	172	182	181	161	171	209	196	202	209	198	203
23	187	178	182	191	167	178	206	190	198	204	197	202
24	195	178	187	202	179	191	199	187	194	198	187	193
25	191	181	186	196	186	192	202	187	194	194	185	190
26	196	185	190	197	189	193	198	191	195	187	181	185
27	192	181	188	201	184	193	204	196	199	191	186	188
28	187	176	181	199	195	196	201	200	197	185	156	169
29	182	176	179	201	195	198	199	194	197	182	169	174
30	174	164	167	203	201	197	204	190	197	189	175	183
31	---	---	---	206	201	201	202	197	199	---	---	---
MONTH	233	164	192	209	153	177	240	181	199	209	156	191

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	14.0	12.0	12.5	4.0	3.5	4.0	.0	.0	.0	.0	.0	.0
2	14.5	13.5	14.0	5.5	4.0	4.5	.0	.0	.0	.5	.0	.0
3	15.0	14.0	14.5	5.0	4.5	4.5	.0	.0	.0	.5	.0	.5
4	16.0	14.5	15.5	4.5	4.0	4.0	.0	.0	.0	.5	.0	.5
5	16.0	15.5	15.5	4.0	3.5	4.0	.0	.0	.0	.5	.0	.0
6	15.5	14.0	15.0	3.5	2.5	3.0	.0	.0	.0	.5	.0	.5
7	14.0	12.5	13.5	2.5	.5	1.5	.0	.0	.0	.0	.0	.0
8	12.5	12.0	12.0	.5	.0	.5	.0	.0	.0	.0	.0	.0
9	12.0	11.5	11.5	1.0	.0	.5	.0	.0	.0	.0	.0	.0
10	11.5	11.0	11.5	1.5	1.0	1.0	.0	.0	.0	.0	.0	.0
11	11.5	10.0	11.0	1.0	.5	1.0	.0	.0	.0	.0	.0	.0
12	12.5	11.0	11.5	1.0	.5	.5	.0	.0	.0	.0	.0	.0
13	12.5	12.0	12.0	1.0	.5	1.0	.0	.0	.0	.0	.0	.0
14	12.0	10.0	11.0	1.5	.5	1.0	.0	.0	.0	.0	.0	.0
15	10.0	9.5	10.0	1.5	1.0	1.5	.0	.0	.0	.0	.0	.0
16	9.5	8.0	8.5	1.5	1.0	1.0	.0	.0	.0	.0	.0	.0
17	8.0	7.5	7.5	1.5	1.0	1.0	.5	.0	.5	.0	.0	.0
18	7.5	7.0	7.0	1.5	1.0	1.0	.5	.0	.0	.5	.0	.0
19	6.5	5.5	6.0	1.5	1.0	1.5	.5	.0	.0	.5	.5	.5
20	5.5	5.0	5.5	1.5	1.5	1.5	.5	.0	.0	.5	.5	.5
21	5.5	4.5	5.0	1.5	.5	1.0	.0	.0	.0	.5	.5	.5
22	4.5	3.5	4.0	1.0	.5	1.0	.0	.0	.0	.5	.0	.5
23	3.5	3.0	3.5	1.0	.5	.5	.0	.0	.0	.5	.5	.5
24	3.5	3.0	3.0	1.0	.5	.5	.0	.0	.0	.5	.5	.5
25	4.0	3.0	3.5	.5	.5	.5	.0	.0	.0	.5	.5	.5
26	4.0	3.0	3.5	1.0	.5	1.0	.0	.0	.0	.5	.0	.5
27	3.0	2.5	2.5	1.0	.5	.5	.0	.0	.0	.0	.0	.0
28	2.5	1.5	2.0	.5	.0	.5	.0	.0	.0	.0	.0	.0
29	3.5	2.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
30	4.0	3.5	3.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
31	4.0	3.5	4.0	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	16.0	1.5	8.5	5.5	.0	1.5	.5	.0	.0	.5	.0	.0

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	3.5	2.0	2.5	12.5	11.0	12.0
2	.0	.0	.0	.0	.0	.0	4.0	2.5	3.5	13.5	11.0	12.0
3	.5	.0	.0	.5	.0	.0	4.5	3.0	4.0	13.5	12.0	12.5
4	.5	.0	.0	.0	.0	.0	4.0	1.5	3.0	13.0	12.0	12.0
5	.0	.0	.0	.0	.0	.0	2.5	1.0	1.5	13.0	12.0	12.5
6	.0	.0	.0	.5	.0	.0	3.5	.5	2.0	13.5	12.0	13.0
7	.0	.0	.0	.5	.0	.0	3.0	1.0	2.0	13.5	11.5	12.5
8	.0	.0	.0	1.0	.0	.5	3.5	.5	2.0	13.0	11.5	12.5
9	.5	.0	.0	.5	.0	.5	4.5	2.0	3.5	13.0	10.5	12.0
10	.5	.5	.5	1.0	.0	.5	6.5	3.5	5.0	13.5	11.5	12.5
11	.5	.0	.5	.5	.0	.5	8.0	5.5	6.5	14.0	12.0	13.0
12	.0	.0	.0	1.0	.5	.5	8.5	7.0	8.0	15.0	13.5	14.0
13	.0	.0	.0	1.5	1.0	1.0	9.0	8.0	8.5	16.0	14.5	15.5
14	.0	.0	.0	1.0	1.0	1.0	9.5	7.5	8.5	17.0	15.0	15.0
15	.0	.0	.0	1.5	.5	1.0	9.5	8.0	8.5	17.5	16.0	17.0
16	.0	.0	.0	1.0	.5	.5	9.5	8.0	9.0	18.0	16.5	17.5
17	.0	.0	.0	.5	.0	.5	9.5	8.5	9.0	18.5	17.5	18.0
18	.0	.0	.0	.5	.5	.5	10.0	8.5	9.0	20.0	18.0	19.0
19	.0	.0	.0	1.0	.5	1.0	10.5	9.0	10.0	20.0	19.0	19.5
20	.0	.0	.0	1.0	.5	1.0	10.5	10.0	10.5	21.0	19.0	20.0
21	.0	.0	.0	1.0	.5	1.0	10.5	10.0	10.5	21.5	19.5	20.5
22	.0	.0	.0	1.0	.5	1.0	11.0	9.5	10.5	21.5	20.0	21.0
23	.5	.0	.0	1.0	.0	1.0	11.0	10.0	10.5	21.0	20.0	20.5
24	.0	.0	.0	.5	.0	.0	10.5	9.5	10.0	21.5	20.0	20.5
25	.0	.0	.0	.5	.0	.5	11.0	8.5	10.0	22.5	20.5	21.5
26	.0	.0	.0	1.0	.0	.5	12.0	9.5	10.5	22.5	21.0	22.0
27	.0	.0	.0	1.0	.5	1.0	12.0	10.0	11.0	23.0	21.0	22.0
28	.0	.0	.0	1.5	1.0	1.0	11.5	9.5	10.5	23.0	21.5	22.0
29	---	---	---	1.5	1.0	1.5	11.5	10.0	10.5	21.0	19.5	20.5
30	---	---	---	2.5	1.0	2.0	12.0	10.5	11.0	21.0	18.5	19.5
31	---	---	---	4.0	2.0	3.0	---	---	---	20.5	19.5	19.5
MONTH	.5	.0	.0	4.8	.0	.5	12.0	.5	7.5	23.0	10.5	17.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	19.5	18.0	18.5	19.0	17.0	18.0	22.5	21.5	22.0	20.5	19.0	19.5
2	17.5	16.0	16.5	18.5	16.5	17.5	22.0	21.0	21.5	20.0	19.0	19.0
3	17.0	15.5	16.0	18.0	17.5	17.5	22.0	21.0	21.5	19.0	18.0	18.5
4	17.5	15.5	16.5	18.0	17.0	17.5	21.0	20.0	20.5	18.5	17.5	18.0
5	17.5	17.0	17.0	20.0	18.0	19.0	21.0	19.5	20.5	17.5	16.5	17.0
6	17.0	17.0	17.0	21.5	19.5	20.5	22.0	20.5	21.0	17.0	15.5	16.0
7	17.0	16.0	16.5	22.5	21.0	21.5	23.0	21.0	22.0	16.5	15.5	16.0
8	17.0	16.0	16.5	23.0	21.0	22.0	24.0	22.5	23.0	16.0	15.0	15.5
9	17.5	15.5	16.5	22.5	21.5	21.5	23.0	22.0	22.5	16.5	15.0	16.0
10	17.5	16.0	17.0	21.5	20.0	21.0	21.5	21.0	21.5	16.0	15.0	15.5
11	17.5	16.0	16.5	22.5	20.5	21.5	21.5	21.0	21.0	15.5	14.5	15.0
12	17.0	15.5	16.0	23.5	21.0	22.0	21.0	---	---	15.5	15.0	15.0
13	17.5	16.0	16.5	23.5	22.0	22.5	---	---	---	15.5	14.5	15.0
14	18.0	16.5	17.0	23.5	22.0	23.0	---	---	---	15.5	14.0	14.5
15	20.0	17.5	18.5	24.0	23.0	23.0	---	---	---	16.0	15.0	15.0
16	19.5	18.5	19.0	25.0	23.5	24.0	---	---	---	15.5	15.0	15.0
17	19.5	18.5	18.5	24.5	23.5	24.0	---	---	---	15.5	15.0	15.0
18	20.0	19.0	19.5	24.0	23.5	24.0	18.0	17.5	17.5	16.5	15.0	15.5
19	20.5	19.5	19.5	24.5	23.0	23.5	17.5	17.0	17.5	16.5	15.5	16.0
20	20.5	19.0	19.5	25.5	24.0	24.5	18.0	17.0	17.5	15.5	15.0	15.0
21	21.0	19.0	20.0	25.5	24.5	25.0	18.0	17.0	17.5	15.0	14.5	14.5
22	21.5	19.5	20.5	25.0	24.0	24.5	18.0	17.0	17.5	15.0	14.5	14.5
23	21.0	19.5	20.0	25.0	24.0	24.5	18.0	17.0	17.5	15.5	14.5	14.5
24	20.5	19.0	19.5	25.0	24.0	24.5	18.0	17.0	17.5	15.0	14.0	14.5
25	21.5	19.5	20.5	24.5	23.5	24.0	18.5	17.0	17.5	16.0	14.5	15.0
26	22.0	21.0	21.5	23.5	22.5	23.0	18.0	17.0	17.5	16.0	15.5	15.5
27	21.5	20.5	21.0	23.0	21.5	22.5	19.0	17.0	18.0	16.0	15.5	16.0
28	21.0	20.0	20.5	22.5	21.5	22.0	19.5	18.5	19.0	16.0	15.0	15.5
29	20.5	20.0	20.5	22.0	21.0	21.0	20.0	18.5	19.5	16.0	15.5	15.5
30	20.5	19.0	19.5	22.0	20.5	21.5	20.5	19.0	20.0	15.5	13.0	14.0
31	---	---	---	22.0	21.0	21.5	20.0	19.5	19.5	---	---	---
MONTH	22.0	15.5	18.5	25.5	16.5	22.0	24.0	17.0	19.5	20.5	13.0	15.5

04057510 STURGEON RIVER NEAR NAHMA JUNCTION, MI

LOCATION.--Lat 45°56'35", long 86°42'20", in SW¼ SE¼ sec.17, T.41 N., R.19 W., Delta County, Hydrologic Unit 04030112, Hiawatha National Forest, on left bank 30 ft (9 m) upstream from bridge on Forest Service Road 2231, 500 ft (152 m) downstream from Mormon Creek, 0.1 mi (0.2 km) east of Federal Forest Highway 13, and 3.2 mi (5.1 km) north of Nahma Junction.

DRAINAGE AREA.--183 mi² (474 km²).

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 610.99 ft (186.230 m) above mean sea level.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Dec. 30 to Feb. 10, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--11 years, 200 ft³/s (5.664 m³/s), 14.84 in/yr (377 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,580 ft³/s (44.7 m³/s) Apr. 18, 1971, Apr. 30, 1972, gage height, 9.85 ft (3.002 m); minimum, 35 ft³/s (0.991 m³/s) Sept. 11, 12, 13, 14, 1976, gage height, 3.58 ft (1.091 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,070 ft³/s (30.3 m³/s) Apr. 15, gage height, 8.17 ft (2.490 m); minimum, 40 ft³/s (1.13 m³/s) Oct. 3, 4, gage height, 3.63 ft (1.106 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	41	59	56	50	50	64	768	309	83	188	103	150
2	41	59	56	50	50	64	700	323	82	163	96	132
3	40	62	54	50	50	64	650	290	78	144	83	116
4	40	64	54	50	50	64	600	262	79	150	93	104
5	53	67	52	50	50	66	561	262	78	171	88	103
6	64	66	52	50	52	66	519	288	80	168	78	103
7	56	65	52	50	52	68	500	263	79	142	69	110
8	53	56	50	50	52	68	460	240	75	154	64	105
9	51	73	50	50	54	72	460	217	71	162	61	99
10	50	68	50	50	54	76	484	199	67	126	60	89
11	50	61	50	50	54	86	543	184	74	109	60	84
12	49	67	50	50	54	130	655	173	79	102	58	103
13	51	69	49	50	54	200	824	163	76	93	58	109
14	52	68	49	50	54	350	1000	155	71	91	58	104
15	53	68	49	50	54	430	1040	146	68	132	55	96
16	54	68	49	50	54	440	1020	138	65	133	68	94
17	58	68	49	50	54	430	939	133	67	114	76	98
18	63	66	49	50	54	400	873	130	76	102	71	95
19	63	67	48	50	54	350	803	124	84	96	65	175
20	65	65	48	50	54	320	731	118	76	87	60	361
21	64	63	48	50	54	300	692	113	69	80	59	344
22	62	66	48	50	54	280	745	108	64	74	60	310
23	62	66	48	50	56	270	709	104	61	69	67	292
24	62	64	48	50	56	270	642	100	64	67	67	300
25	61	64	48	50	58	270	580	94	120	82	63	540
26	61	62	48	50	60	350	512	90	100	71	83	503
27	61	62	48	50	62	447	452	87	126	65	102	421
28	60	60	48	50	64	604	403	84	300	63	101	363
29	60	60	48	50	---	878	360	79	259	68	89	327
30	60	58	48	50	---	895	328	76	206	73	79	313
31	60	---	49	50	---	864	---	76	---	99	102	---
TOTAL	1720	1931	1545	1550	1518	9236	19553	5128	2877	3438	2296	6143
MEAN	55.5	64.4	49.8	50.0	54.2	298	652	165	95.9	111	74.1	205
MAX	65	73	56	50	64	895	1040	323	300	188	103	540
MIN	40	56	48	50	50	64	328	76	61	63	55	84
CFSM	.30	.35	.27	.27	.30	1.63	3.56	.90	.52	.61	.41	1.12
IN.	.35	.39	.31	.32	.31	1.88	3.97	1.04	.58	.70	.47	1.25

CAL YR 1976 TOTAL 56635 MEAN 155 MAX 971 MIN 35 CFSM .85 IN 11.51
WTR YR 1977 TOTAL 56935 MEAN 156 MAX 1040 MIN 40 CFSM .85 IN 11.57

04057800 MIDDLE BRANCH ESCANABA RIVER AT HUMBOLDT, MI

LOCATION.--Lat 46°29'57", long 87°53'11", in SW¼ sec.1, T.47 N., R.29 W., Marquette County, Hydrologic Unit 04030110, on left bank 15 ft (5 m) upstream from county highway, 0.3 mi (0.5 km) north of Humboldt, and 1.5 mi (2.4 km) downstream from Halfway Creek.

DRAINAGE AREA.--46.0 mi² (119.1 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1959 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. V-notch sharp-crested weir since Oct. 3, 1960. Datum of gage is 1,521.20 ft (463.662 m) above mean sea level (Cleveland-Cliffs Iron Co. bench mark). Prior to Sept. 1, 1960, nonrecording gage at same site and datum.

REMARKS.--Water-discharge record good. From July 1960 to June 1972, some diversion 100 ft (30 m) above station by industry for iron ore processing; figures of runoff adjusted.

AVERAGE DISCHARGE.--18 years, 59.5 ft³/s (1.685 m³/s), 17.57 in/yr (446 mm/yr), adjusted for diversion 1960 to 1972.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,640 ft³/s (46.4 m³/s) Apr. 24, 1960, gage height, 8.30 ft (2.530 m), from flood-mark; minimum, 4.0 ft³/s (0.11 m³/s) Sept. 12, 1976; minimum gage height, 1.07 ft (0.326 m) Aug. 24, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 492 ft³/s (13.9 m³/s) Apr. 14, gage height, 5.27 ft (1.606 m); minimum, 4.3 ft³/s (0.12 m³/s) Oct. 3, gage height, 1.48 ft (0.451 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.7	5.8	5.3	5.2	5.8	6.4	193	70	27	20	17	30
2	4.7	6.1	5.3	5.2	5.8	6.6	168	63	28	19	14	26
3	4.6	6.3	5.3	5.2	5.8	6.0	130	56	23	22	15	18
4	4.8	6.5	5.3	5.2	5.8	6.2	108	50	22	35	22	38
5	4.7	6.3	5.3	5.0	5.8	6.3	85	52	20	42	19	77
6	4.9	6.3	5.6	5.0	5.8	6.3	115	53	28	33	17	63
7	5.1	6.1	5.8	5.0	5.8	6.3	93	48	28	24	14	64
8	5.6	5.8	5.6	5.0	5.8	6.5	80	43	24	18	12	54
9	5.8	6.1	5.3	5.0	5.8	7.9	76	40	20	15	18	53
10	5.8	6.3	5.6	5.0	5.8	9.0	88	37	17	13	18	60
11	5.6	6.3	5.6	5.0	5.8	10	140	36	15	12	16	48
12	5.6	6.1	5.6	5.0	5.8	36	227	33	15	12	13	41
13	5.8	6.3	5.6	5.0	5.8	63	362	30	14	11	14	39
14	6.5	6.1	5.6	5.0	5.8	56	476	29	13	16	20	30
15	7.3	5.8	5.8	5.0	5.8	61	410	26	12	98	13	25
16	7.5	5.8	5.6	5.2	5.8	61	412	26	12	93	18	24
17	7.3	5.8	5.6	5.2	5.8	65	377	24	14	125	28	25
18	6.8	6.3	5.6	5.4	5.8	55	324	23	13	89	21	24
19	6.5	6.1	5.8	5.4	5.8	60	302	23	14	57	17	39
20	6.5	6.1	5.8	5.4	5.8	48	303	31	12	41	14	44
21	6.5	6.1	5.8	5.6	5.8	50	281	44	11	31	12	42
22	6.3	6.1	5.8	5.5	6.1	44	297	44	10	23	12	39
23	6.1	6.1	5.8	5.5	6.2	37	266	39	9.5	19	13	49
24	5.6	5.8	5.8	5.5	6.6	35	202	33	10	16	12	63
25	5.8	5.8	5.8	5.5	7.2	30	165	27	12	23	11	108
26	5.8	5.5	5.8	5.5	6.8	32	137	25	12	16	10	112
27	5.6	5.5	5.6	5.5	6.6	48	112	24	11	12	11	92
28	5.6	5.3	5.5	5.8	6.6	62	95	20	16	12	14	77
29	6.3	5.3	5.3	5.8	---	125	82	17	16	13	12	71
30	6.3	5.3	5.2	5.8	---	176	74	16	15	13	10	71
31	6.1	---	5.2	5.8	---	199	---	15	---	19	21	---
TOTAL	182.1	179.1	172.6	164.2	167.9	1420.5	6180	1097	493.5	992	478	1546
MEAN	5.87	5.97	5.57	5.30	6.00	45.8	206	35.4	16.5	32.0	15.4	51.5
MAX	7.5	6.5	5.8	5.8	7.2	199	476	70	28	125	28	112
MIN	4.6	5.3	5.2	5.0	5.8	6.0	74	15	9.5	11	10	18
CFSM	.13	.13	.12	.12	.13	1.00	4.48	.77	.36	.70	.34	1.12
IN.	.15	.14	.14	.13	.14	1.15	5.00	.89	.40	.80	.39	1.25

CAL YR 1976 TOTAL 17397.2 MEAN 47.5 MAX 796 MIN 4.2 CFSM 1.03 IN 14.07
WTR YR 1977 TOTAL 13072.9 MEAN 35.8 MAX 476 MIN 4.6 CFSM .78 IN 10.57

04057800 MIDDLE BRANCH ESCANABA RIVER AT HUMBOLDT, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1972 to current year.

INSTRUMENTATION.--Temperature recorder since Nov. 10, 1972.

REMARKS.--Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 26.0°C July 19, 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 26.0°C July 19, 20; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	13.5	8.0	3.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	13.5	9.0	3.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	13.0	8.0	2.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	13.5	10.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	13.5	10.5	1.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	11.0	8.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	8.0	7.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	8.0	5.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	8.0	6.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	7.5	6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	9.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	9.5	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	9.5	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	8.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	6.5	5.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	5.0	3.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
17	4.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	3.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	4.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	4.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	3.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
22	3.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
23	3.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
24	3.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	3.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
26	2.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0
27	2.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5
28	3.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
29	4.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	---	---	0.5	0.0
30	4.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	---	---	0.0	0.0
31	3.0	1.5	---	---	0.0	0.0	0.0	0.0	---	---	1.0	0.0
MONTH	13.5	1.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0

04057800 MIDDLE BRANCH ESCANABA RIVER AT HUMBOLDT, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	0.0	0.0	13.0	10.5	16.0	13.5	18.5	15.0	19.0	15.0	18.0	16.0
2	0.0	0.0	13.0	9.0	17.5	11.0	20.0	12.5	19.5	15.0	18.0	15.5
3	1.0	0.0	13.0	8.5	18.5	11.0	20.0	15.5	19.5	15.0	17.0	12.5
4	0.0	0.0	13.0	9.5	20.0	15.0	20.0	16.5	18.0	14.5	17.0	13.5
5	0.0	0.0	13.5	11.0	20.0	15.0	22.5	18.0	18.5	15.5	15.0	14.0
6	0.0	0.0	12.5	10.0	18.0	13.5	23.5	20.0	18.5	13.5	14.5	13.0
7	0.0	0.0	13.0	8.0	17.5	12.0	24.5	20.0	20.0	15.0	14.0	12.5
8	1.0	0.5	13.0	8.5	17.0	12.0	24.5	19.5	20.0	16.0	14.5	12.5
9	2.0	0.5	13.0	7.0	18.0	10.5	23.0	16.5	20.0	15.0	14.5	14.0
10	4.0	0.5	12.5	7.5	17.5	11.5	20.0	14.0	18.0	15.0	14.5	12.5
11	4.5	1.5	15.5	8.5	15.0	12.0	20.5	17.0	17.5	14.0	14.0	11.0
12	4.5	2.0	17.5	11.0	17.0	12.0	21.0	18.5	16.5	12.0	13.0	11.5
13	5.0	3.5	18.5	13.0	17.0	11.0	23.5	17.0	18.5	14.5	13.0	11.0
14	6.0	3.0	19.0	13.0	17.0	11.5	24.0	19.0	18.5	13.0	14.0	10.0
15	7.0	5.5	19.0	14.0	17.5	13.0	22.0	20.0	17.5	12.5	14.0	10.5
16	9.5	6.5	19.5	14.5	17.5	14.5	22.0	19.5	15.0	13.5	13.0	11.5
17	9.5	8.0	21.0	15.0	19.0	13.5	21.5	19.5	14.5	12.5	13.0	11.5
18	9.5	8.0	22.5	17.0	19.0	16.5	23.5	20.5	15.5	11.0	14.5	12.5
19	12.0	9.5	22.0	17.0	19.0	14.5	26.0	22.0	16.5	12.0	14.5	12.0
20	12.5	11.0	21.0	17.0	20.5	15.0	26.0	23.5	16.0	11.5	12.0	10.5
21	12.5	9.5	19.5	17.0	20.0	13.5	24.5	20.0	16.0	13.0	12.0	9.0
22	11.5	8.0	20.0	16.5	20.0	13.5	23.5	17.0	16.0	11.5	12.0	10.5
23	11.0	8.5	19.5	16.5	19.5	16.0	24.0	18.5	15.0	10.5	11.0	10.5
24	10.0	7.0	21.0	15.5	19.0	16.0	24.0	19.5	15.5	10.5	10.5	10.5
25	9.5	5.5	21.5	15.5	21.0	15.0	24.0	18.5	15.5	10.5	11.5	10.5
26	10.5	7.0	22.0	16.0	22.5	15.0	21.5	15.5	15.5	13.5	11.5	11.0
27	10.5	8.5	23.0	16.0	22.0	18.0	20.5	15.5	18.5	15.5	11.0	11.0
28	10.0	7.0	22.5	16.5	20.5	17.5	19.5	16.5	18.5	17.5	12.5	10.5
29	10.5	7.0	20.5	16.0	21.0	16.0	20.5	15.5	18.0	14.0	12.0	11.5
30	13.0	9.0	20.5	15.0	21.0	16.0	20.0	15.5	18.0	14.5	11.5	10.0
31	---	---	20.5	15.5	---	---	19.5	16.5	18.0	16.0	---	---
MONTH	13.0	0.0	23.0	7.0	22.5	10.5	26.0	12.5	20.0	10.5	18.0	9.0

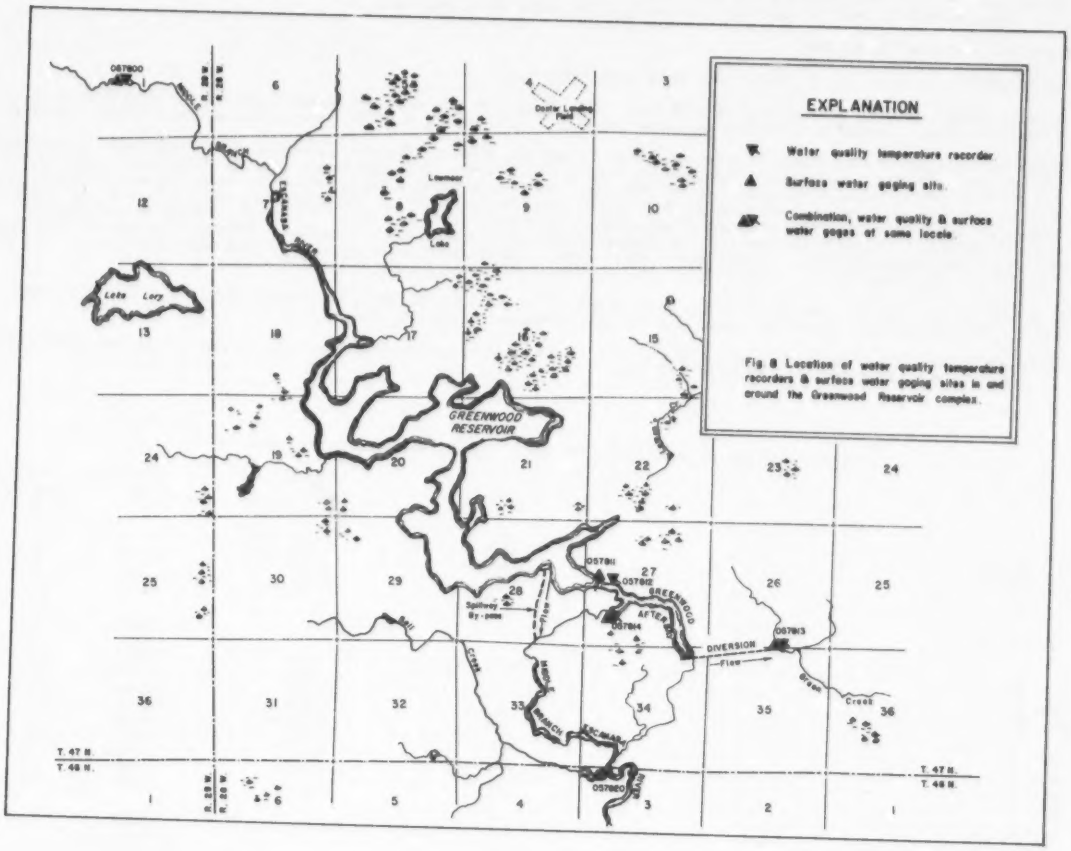

Fig 8 Location of water quality temperature recorders & surface water gaging sites in and around the Greenwood Reservoir complex.

Greenwood Reservoir is formed by an earth/rockfill main dam (Greenwood Dam) and several earthfill dikes surrounding the storage area. Storage began Dec. 22, 1972, and the fixed-crest concrete spillway was completed in September 1973. The usable capacity of the reservoir is 23,300 acre-ft (28.7 hm^3) at a spillway elevation of 1515 ft (461.8 m). At pool elevation exceeding 1515 ft (461.8 m), water flows over the spillway into the Middle Branch Escanaba River below Greenwood Release (04057814). At lower pool elevations, outflow from Greenwood Reservoir into Greenwood Afterbay is completely regulated by the multiport outlet of Greenwood Dam. Greenwood Afterbay has two outlets; one for diversion by pipeline into Green Creek and the second for releasing flows to Middle Branch Escanaba River. Water temperatures are measured directly below Greenwood Dam (Greenwood Afterbay, 04057813), and the gaging station below the release from the afterbay to Middle Branch Escanaba River (Greenwood Release, 04057814).

04057811 GREENWOOD RESERVOIR NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'32", long 87°48'02", in NW¼ SW¼ sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, at downstream side of dam, on Middle Branch Escanaba River, 3.7 mi (6.0 km) southwest of Greenwood.

DRAINAGE AREA.--67.4 mi² (174.6 km²).

PERIOD OF RECORD.--December 1972 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is 1,400.00 ft (246.720 m) above mean sea level (levels by Cleveland Cliffs Iron Co.). Gage readings have been converted to elevations above mean sea level. Prior to Feb. 20, 1973, nonrecording gage at same site and datum.

REMARKS.--The reservoir is formed by an earth/rockfill main dam and several earthfill dykes surrounding the storage area. Storage began Dec. 22, 1972. The fixed-crest concrete spillway was completed in September 1973. The usable capacity of the reservoir is 23,300 acre-ft (28.7 hm³) at spillway elevation 1,515 ft (461.8 m). Above elevation of 1,515 ft (461.8 m), water flows over concrete spillway into Middle Branch Escanaba River about 2,000 ft (610 m) below station 04057814. The main dam is equipped with an outlet structure with 4 valves to control flow to afterbay (conservation pool) which has a capacity of 420 acre-ft (518,000 m³) at elevation 1,480 ft (451.1 m). Two outlet systems from the afterbay provide for diversion and release flow. Diverted flow gaged at Greenwood Diversion (see station 04057813); released flow to Middle Branch Escanaba River gaged at Greenwood (see station 04057814). Reservoir impounds water for diversion to Schweitzer Reservoir (see station 04058190), for use in iron ore processing.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 25,200 acre-ft (31.1 hm³) Apr. 18, 1976, elevation, 1,516.4 ft (462.20 m); minimum since first filling, 3,240 acre-ft (3.99 hm³) Mar. 12, 1977, elevation, 1,491.1 ft (454.49 m).

EXTREMES FOR CURRENT YEAR.--Maximum contents, 20,700 acre-ft (25.5 hm³) May 18, elevation, 1,513.0 ft (461.16 m); minimum, 3,240 acre-ft (3.99 hm³) Mar. 12, elevation, 1,491.1 ft (454.49 m).

MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in ft³/s)
Sept. 30	1507.9	14900	--	--
Oct. 31	1505.2	12280	-2620	-42.6
Nov. 30	1502.8	10240	-2040	-34.3
Dec. 31	1499.9	8130	-2110	-34.3
CAL YR 1976	--	--	-15310	-21.1
Jan. 31	1496.3	5780	-2350	-38.2
Feb. 28	1492.5	3800	-1980	-35.6
Mar. 31	1497.1	6260	+2460	+40.0
Apr. 30	1512.4	19980	+13720	+231
May 31	1512.6	20220	+240	+3.9
June 30	1511.0	18300	+1920	-32.3
July 31	1511.3	18660	+360	+5.9
Aug. 31	1511.0	18300	-360	-5.9
Sept. 30	1512.8	20460	+2160	+36.3
WTR YR 1977	--	--	+5560	+7.7

04057812 GREENWOOD AFTERBAY NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'32", long 87°48'02", in NW¼ SW¼ sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, in control house on downstream side of Greenwood Dam on the Middle Branch Escanaba River, 3.5 miles (5.6 km) southwest of Greenwood.

DRAINAGE AREA.--67.4 mi² (174.6 km²).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: January 1973 to current year.

INSTRUMENTATION.--Temperature recorder since Jan. 31, 1973.

REMARKS.--Flow regulated by the multi-port outlets of Greenwood Reservoir. Altitude of outlets are: (No. 1) 1,505 ft (458.7 m), (No. 2) 1,495 ft (455.7 m), (No. 3) 1,485 ft (452.6 m), (No. 4) 1,478 ft (450.5 m) above mean sea level. Outlets open were: Oct. 1 to Apr. 27, No. 4; Apr. 27 to June 22, No. 2; June 22 to Sept. 30, No. 3.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.5°C July 14, 15, 1974; minimum, freezing point on many days during January to March 1973.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 18.0°C June 18, 21, 22; minimum, 1.0°C Nov. 11-22, Mar. 9-31, Apr. 11.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	12.5	12.5	4.5	4.0	1.5	1.5	1.5	1.5	2.0	2.0	1.5	1.5
2	12.5	12.5	4.0	4.0	1.5	1.5	1.5	1.5	2.0	2.0	1.5	1.5
3	12.5	12.5	4.0	3.5	1.5	1.5	1.5	1.5	2.0	2.0	1.5	1.5
4	12.5	12.0	3.5	3.5	1.5	1.5	2.0	1.5	2.0	2.0	1.5	1.5
5	12.0	12.0	3.5	3.0	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5
6	12.0	11.5	3.0	3.0	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5
7	11.5	11.5	3.0	2.0	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5
8	11.5	11.5	2.0	2.0	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5
9	11.5	11.0	2.0	2.0	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.0
10	11.0	10.5	2.0	1.5	1.5	1.5	2.0	2.0	2.0	2.0	1.0	1.0
11	10.5	10.0	1.5	1.0	1.5	1.5	2.0	2.0	2.0	2.0	1.0	1.0
12	10.0	10.0	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.0	1.0	1.0
13	10.0	9.5	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.0	1.0	1.0
14	9.5	9.5	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.0	1.0	1.0
15	9.5	9.0	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.0	1.0	1.0
16	9.0	9.0	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.0	1.0	1.0
17	9.0	8.5	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.0	1.0	1.0
18	8.5	8.0	1.0	1.0	1.5	1.5	2.0	2.0	2.0	1.5	1.0	1.0
19	8.0	8.0	1.0	1.0	1.5	1.5	2.0	2.0	1.5	1.5	1.0	1.0
20	8.0	7.5	1.0	1.0	1.5	1.5	2.0	2.0	1.5	1.5	1.0	1.0
21	8.5	7.0	1.0	1.0	1.5	1.5	2.0	2.0	1.5	1.5	1.0	1.0
22	7.0	6.5	1.0	1.0	1.5	1.5	2.0	2.0	1.5	1.5	1.0	1.0
23	6.5	6.5	1.5	1.0	1.5	1.5	2.0	2.0	1.5	1.5	1.0	1.0
24	6.5	6.0	1.5	1.5	1.5	1.5	2.0	2.0	1.5	1.5	1.0	1.0
25	6.0	6.0	1.5	1.5	1.5	1.5	2.0	2.0	1.5	1.5	1.0	1.0
26	6.0	5.5	1.5	1.5	1.5	1.5	2.0	2.0	1.5	1.5	1.0	1.0
27	5.5	5.0	1.5	1.5	1.5	1.5	2.0	2.0	1.5	1.5	1.0	1.0
28	5.0	4.5	1.5	1.5	1.5	1.5	2.0	2.0	1.5	1.5	1.0	1.0
29	4.5	4.5	1.5	1.5	1.5	1.5	2.0	2.0	---	---	1.0	1.0
30	4.5	4.5	1.5	1.5	1.5	1.5	2.0	2.0	---	---	1.0	1.0
31	4.5	4.5	---	---	1.5	1.5	2.0	2.0	---	---	1.5	1.0
MONTH	12.5	4.5	4.5	1.0	1.5	1.5	2.0	1.5	2.0	1.5	1.5	1.0

04057812 GREENWOOD AFTERBAY NEAR GREENWOOD, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	1.5	1.0	10.5	8.0	16.5	15.5	17.0	14.5	17.5	16.5	16.5	16.0
2	1.5	1.5	10.5	8.5	16.5	16.0	15.5	15.0	16.0	16.0	16.0	15.5
3	1.5	1.5	9.5	9.0	16.0	16.0	15.0	14.5	16.0	16.0	16.0	16.0
4	1.5	1.5	9.5	9.0	16.0	16.0	15.0	14.5	16.0	16.0	16.0	16.0
5	1.5	1.5	11.5	9.5	16.5	16.0	15.0	14.5	16.0	16.0	16.0	16.0
6	1.5	1.5	12.0	10.0	17.5	16.5	14.5	14.5	16.0	16.0	16.0	16.0
7	1.5	1.5	11.0	11.0	17.0	16.5	14.5	14.0	16.5	16.0	16.0	16.0
8	1.5	1.5	12.0	11.0	17.0	17.0	14.5	14.5	16.0	15.5	16.0	15.5
9	1.5	1.5	11.5	11.5	17.0	17.0	14.5	14.5	16.0	16.0	16.5	15.5
10	1.5	1.5	12.0	11.5	17.0	16.0	15.0	14.5	16.5	16.0	16.5	16.0
11	1.5	1.0	11.5	11.5	16.5	16.5	15.0	14.5	17.5	16.0	16.0	16.0
12	1.5	1.5	12.0	11.5	16.5	16.5	15.0	14.5	16.5	16.5	16.0	16.0
13	1.5	1.5	12.0	11.5	16.5	16.5	15.5	15.0	16.5	16.0	16.0	15.5
14	2.0	1.5	12.0	12.0	16.5	16.0	17.0	13.5	16.5	16.0	15.5	15.5
15	2.0	2.0	12.0	11.5	16.0	16.0	16.0	14.5	16.0	16.0	15.5	15.5
16	2.5	2.0	12.0	12.0	16.0	16.0	15.5	15.0	16.5	16.0	15.5	15.5
17	2.5	2.5	12.0	11.5	16.0	16.0	15.5	14.5	17.0	16.5	15.5	15.5
18	3.0	2.5	12.0	12.0	18.0	16.0	16.0	15.0	17.0	16.0	15.5	15.5
19	4.0	3.0	12.0	12.0	17.5	17.0	15.5	15.0	16.5	16.0	15.5	15.0
20	4.0	4.0	13.0	12.0	17.5	17.0	16.0	15.0	16.0	16.0	15.0	15.0
21	5.0	4.0	12.5	12.5	18.0	17.5	15.5	15.5	16.5	16.0	15.0	15.0
22	5.5	5.0	13.0	12.0	18.0	11.0	15.5	15.0	17.0	16.0	15.0	14.5
23	6.0	5.0	13.5	12.0	15.5	10.0	15.5	15.5	16.5	16.0	14.5	14.5
24	6.0	6.0	14.0	13.0	11.5	10.5	16.0	15.0	16.5	16.0	14.5	14.0
25	6.5	6.0	14.5	13.0	13.0	11.5	16.0	15.0	16.0	16.0	14.0	14.0
26	6.0	5.5	14.5	13.5	13.5	12.5	15.5	15.5	16.0	16.0	14.0	14.0
27	8.0	5.0	14.5	14.0	14.0	13.0	15.5	15.5	16.0	16.0	14.0	14.0
28	8.0	7.5	15.0	14.0	14.5	13.5	15.5	15.5	16.0	16.0	14.0	14.0
29	8.5	7.5	15.5	14.5	15.0	14.0	16.0	15.5	16.0	16.0	14.0	14.0
30	8.0	7.5	15.0	15.0	15.0	14.0	16.0	15.5	16.0	16.0	14.0	14.0
31	---	---	15.5	15.0	---	---	16.5	15.5	16.0	16.0	---	---
MONTH	8.5	1.0	15.5	8.0	18.0	10.0	17.0	13.5	17.5	15.5	16.5	14.0

04057813 GREENWOOD DIVERSION NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'04", long 87°46'10", in NW¼ NE¼ sec.35, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on left bank at downstream end of pipeline, 200 ft (61 m) upstream from Green Creek, 0.7 mi (1.1 km) downstream from Greenwood Afterbay, and 3.6 mi (5.8 km) south of Greenwood.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--December 1972 to current year.

GAGE.--Water-stage recorder and concrete flume. Altitude of gage is 1,460 ft (445 m) from topographic map (nearest 10 ft). Prior to Aug. 22, 1973, nonrecording gage at same site and datum.

REMARKS.--Water-discharge record good. Flow completely regulated. A pipeline, 0.7 mi (1.1 km) long, diverts water from Greenwood Reservoir (see station 04057811) into Green Creek, tributary to Schweitzer Reservoir (see station 04058190). Water is used for iron ore processing and some returned to Middle Branch Escanaba River via another Green Creek (tributary to Middle Branch Escanaba River); 27 mi (43 km) below station.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 30 ft³/s (0.85 m³/s) June 25-28, 1977; no flow Dec. 27, 1972 to Jan. 6, 1973.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	22	19	17	15	16	14	.09	.12	21	14	1.2	1.2
2	22	19	16	15	16	14	.10	.12	24	12	1.2	1.2
3	22	19	16	15	16	14	.10	.12	25	10	1.2	1.2
4	22	19	16	15	16	13	.10	.12	26	10	1.2	1.2
5	21	19	16	15	16	12	.11	.21	26	8.4	1.2	1.2
6	21	19	16	15	16	12	.10	.29	26	5.4	1.2	1.2
7	21	19	16	15	16	11	.11	.30	26	4.3	1.2	1.2
8	21	19	16	15	16	10	.09	.30	26	4.4	1.2	1.1
9	21	18	16	15	16	9.6	.09	.30	26	4.4	1.2	.59
10	21	17	16	15	14	7.8	.10	1.1	26	4.3	1.2	.12
11	21	17	16	15	14	6.4	.12	2.8	27	4.3	1.2	.12
12	20	17	16	16	14	4.4	.12	4.4	27	4.4	1.2	.12
13	19	17	16	16	14	1.2	.11	5.1	27	4.3	1.2	.09
14	19	17	16	16	14	.09	.12	5.0	27	4.2	1.2	.10
15	19	17	16	16	14	.09	.11	4.8	27	4.2	1.2	.09
16	19	16	16	16	14	.09	.12	4.7	27	4.1	1.2	.09
17	19	15	16	16	14	.08	.12	4.5	27	4.1	1.2	.09
18	19	15	16	16	14	.09	.12	4.5	27	3.4	1.2	.09
19	19	15	16	16	14	.09	.12	5.8	27	2.6	1.2	.09
20	19	15	16	16	14	.09	.12	8.6	27	2.7	1.2	.07
21	19	15	16	16	14	.09	.12	9.1	26	2.7	1.2	.06
22	19	15	16	16	14	.09	.12	9.3	21	2.7	1.2	.06
23	19	14	16	16	14	.10	.12	9.9	18	2.7	1.2	.06
24	19	13	16	16	14	.12	.12	14	26	2.7	1.2	.06
25	19	13	16	16	14	.10	.12	17	30	2.7	1.2	.06
26	19	13	16	16	14	.10	.12	19	30	2.7	1.2	.06
27	19	13	16	16	14	.12	.12	19	30	2.8	1.2	.06
28	19	13	16	16	14	.12	.12	19	30	2.8	1.2	.06
29	19	13	16	16	---	.11	.12	20	27	1.9	1.2	.06
30	19	14	15	16	---	.12	.12	20	19	1.2	1.2	.06
31	19	---	15	16	---	.10	---	20	---	1.2	1.2	---
TOTAL	616	484	495	485	410	131.19	3.37	229.48	779	141.6	37.2	11.76
MEAN	19.9	16.1	16.0	15.6	14.6	4.23	.11	7.40	26.0	4.57	1.20	.39
MAX	22	19	17	16	16	14	.12	20	30	14	1.2	1.2
MIN	19	13	15	15	14	.08	.09	.12	18	1.2	1.2	.06

CAL YR 1976 TOTAL 4906.20 MEAN 13.4 MAX 22 MIN 6.6
WTR YR 1977 TOTAL 3823.40 MEAN 10.5 MAX 30 MIN .06

04057813 GREENWOOD DIVERSION NEAR GREENWOOD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: September 1973 to current year.

INSTRUMENTATION.--Temperature recorder since Aug. 31, 1973.

REMARKS.--Flow regulated by inlet structure of pipeline from Greenwood Afterbay 0.7 mile (1.1 km) above station.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 22.5°C July 18, 19, 1974; minimum, 0.5°C Mar. 16, 17, 19, Apr. 3, 1977.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 19.5°C June 23; minimum, 0.5°C Mar. 16, 17, 19, Apr. 3.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	11.5	11.5	4.0	4.0	2.0	2.0	1.5	1.0	2.0	2.0	1.5	1.5
2	11.5	11.5	4.0	4.0	2.0	2.0	1.0	1.0	2.0	2.0	1.5	1.5
3	12.0	11.5	4.0	3.5	2.0	2.0	1.0	1.0	2.0	2.0	1.5	1.5
4	12.5	12.0	3.5	3.5	2.0	1.5	2.0	1.0	2.0	2.0	1.5	1.5
5	13.0	12.5	3.5	3.0	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5
6	13.0	12.5	3.0	3.0	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5
7	12.5	10.5	3.0	2.5	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5
8	10.5	10.0	2.5	2.5	1.5	1.5	2.0	2.0	2.0	1.5	1.5	1.0
9	10.0	10.0	2.5	2.5	1.5	1.5	2.0	2.0	1.5	1.5	1.0	1.0
10	10.0	10.0	2.5	2.5	1.5	1.5	2.0	2.0	1.5	1.5	1.0	1.0
11	10.0	9.5	2.5	2.5	1.5	1.5	2.0	2.0	1.5	1.5	1.5	1.0
12	9.5	9.5	2.5	2.5	1.5	1.5	2.0	2.0	1.5	1.5	1.5	1.5
13	10.0	9.5	2.5	2.5	1.5	1.5	2.0	2.0	1.5	1.5	2.0	1.5
14	10.0	10.0	2.5	2.5	1.5	1.0	2.0	2.0	1.5	1.5	3.5	1.5
15	10.0	9.0	2.5	2.5	1.0	1.0	2.0	2.0	1.5	1.5	2.0	1.5
16	9.0	8.5	2.5	2.0	1.0	1.0	2.0	2.0	1.5	1.5	1.5	0.5
17	8.5	7.5	1.5	1.5	1.0	1.0	2.0	2.0	1.5	1.5	2.5	0.5
18	7.5	7.0	1.5	1.5	1.0	1.0	2.0	2.0	1.5	1.0	3.5	1.0
19	7.0	6.5	1.5	1.5	1.0	1.0	2.0	2.0	1.0	1.0	3.0	0.5
20	6.5	6.5	1.5	1.5	1.5	1.0	2.0	2.0	1.5	1.0	4.5	1.5
21	6.5	6.0	2.0	2.0	1.5	1.5	2.0	2.0	1.5	1.0	4.5	1.5
22	6.0	5.5	2.0	2.0	1.5	1.5	2.0	2.0	1.0	1.0	4.0	1.5
23	5.5	5.0	2.0	2.0	1.5	1.5	2.0	2.0	1.0	1.0	4.5	1.5
24	5.0	5.0	2.0	2.0	1.5	1.5	2.0	2.0	1.0	1.0	2.0	1.5
25	5.0	4.5	2.0	1.5	1.5	1.5	2.0	2.0	1.0	1.0	4.0	1.5
26	4.5	4.0	1.5	1.5	1.5	1.5	2.0	2.0	1.0	1.0	4.0	1.5
27	4.0	4.0	1.5	1.5	1.5	1.5	2.0	2.0	1.5	1.0	3.0	2.5
28	4.0	3.5	2.0	1.5	1.5	1.5	2.0	2.0	1.5	1.5	2.5	2.5
29	3.5	3.5	2.0	2.0	1.5	1.5	2.0	2.0	---	---	3.0	2.5
30	3.5	3.5	2.0	2.0	1.5	1.5	2.0	2.0	---	---	4.0	2.0
31	4.0	3.5	---	---	1.5	1.5	2.0	2.0	---	---	5.0	1.5
MONTH	13.0	3.5	4.0	1.5	2.0	1.0	2.0	1.0	2.0	1.0	5.0	0.5

04057413 GREENWOOD DIVERSION NEAR GREENWOOD, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	2.0	1.0	8.5	5.5	17.5	17.0	16.5	16.5	17.5	17.5	16.5	16.5
2	2.0	1.0	9.5	5.0	17.5	15.0	17.0	16.5	17.5	17.5	16.5	16.5
3	4.5	0.5	9.0	5.5	16.5	15.0	16.5	16.5	17.5	17.0	16.5	16.5
4	1.5	1.0	8.0	6.0	17.0	16.5	17.0	16.5	17.0	17.0	16.5	16.5
5	1.5	1.0	8.0	5.5	17.5	17.0	17.0	17.0	17.0	17.0	16.5	16.5
6	3.5	1.0	6.0	5.5	18.0	17.0	17.0	17.0	17.0	17.0	16.5	16.5
7	3.0	1.0	6.5	5.5	18.0	17.0	17.0	17.0	17.0	17.0	16.5	16.5
8	5.0	1.0	6.5	5.5	17.5	17.0	17.0	17.0	17.0	17.0	16.5	16.5
9	5.0	1.5	6.5	6.0	17.5	17.0	17.0	17.0	17.0	17.0	16.5	15.5
10	7.5	2.0	6.0	5.5	17.0	17.0	17.0	17.0	17.0	17.0	18.0	15.5
11	7.8	3.0	5.5	5.5	17.5	17.0	17.0	17.0	17.0	17.0	17.0	15.0
12	6.5	3.0	6.5	5.5	17.0	16.5	17.0	17.0	17.0	17.0	16.0	15.0
13	6.0	2.5	8.0	6.5	17.0	16.5	17.0	17.0	17.0	17.0	16.5	15.0
14	7.0	2.5	9.5	8.0	17.0	16.5	17.0	16.5	17.0	17.0	17.5	15.0
15	5.5	3.0	10.5	9.5	17.0	17.0	17.0	16.5	17.0	17.0	16.5	15.0
16	6.5	3.5	11.0	10.5	17.5	17.0	17.0	17.0	17.0	17.0	15.5	15.0
17	4.0	3.5	11.5	11.0	17.5	17.0	17.5	17.0	17.0	17.0	15.5	15.5
18	5.5	4.0	12.0	11.5	18.0	17.0	17.5	17.0	17.0	17.0	17.0	15.5
19	7.8	4.5	13.0	12.0	18.0	18.0	17.5	17.5	17.0	16.5	15.5	14.0
20	6.5	4.5	14.5	13.0	18.5	18.0	17.5	17.5	16.5	16.5	14.0	14.0
21	5.5	4.5	15.5	14.5	19.0	18.5	17.5	17.5	16.5	16.5	17.0	13.5
22	7.5	4.0	15.5	15.5	19.0	19.0	17.5	17.5	16.5	16.5	14.0	14.0
23	7.0	4.5	15.5	15.5	19.5	16.0	17.5	17.5	16.5	16.5	14.0	14.0
24	5.0	4.5	16.5	15.5	16.0	13.0	17.5	17.5	16.5	16.5	14.0	12.5
25	7.5	4.0	16.5	16.5	13.5	13.0	17.5	17.5	16.5	16.5	15.0	13.5
26	8.5	4.5	17.0	16.5	14.0	13.5	17.5	17.5	16.5	16.5	14.0	13.5
27	8.0	4.5	17.0	17.0	14.5	14.0	17.5	17.5	16.5	16.5	14.0	13.5
28	8.5	4.0	17.5	17.0	15.5	14.5	17.5	17.5	16.5	16.5	16.0	13.0
29	8.5	4.0	17.5	17.5	15.5	15.5	17.5	17.5	16.5	16.5	14.5	13.0
30	9.5	5.0	18.0	17.5	16.5	15.5	17.5	17.5	16.5	16.5	13.5	12.5
31	---	---	17.5	17.5	---	---	17.5	17.5	16.5	16.5	---	---
MONTH	9.5	0.5	18.0	5.0	19.5	13.0	17.5	16.5	17.5	16.5	18.0	12.5

04057814 GREENWOOD RELEASE NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'22", long 87°47'52", in NW¼ SW¼ sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on left bank at outlet of Greenwood Afterbay releasing to Middle Branch Escanaba River, 2.6 mi (4.2 km) upstream from Bell Creek and 3.8 mi (6.1 km) southwest of Greenwood.

DRAINAGE AREA.--67.4 mi² (174.6 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1972 to current year.

GAGE.--Water-stage recorder and concrete flume. Altitude of gage is 1,480 ft (451 m) from topographic map (nearest 10 ft). Prior to Nov. 7, 1973, nonrecording gage at same site and different datum.

REMARKS.--Water discharge record good. Since December 1972, flow from Greenwood Reservoir (see sta 04057811) below spillway elevation 1,515 ft (462 m) is completely regulated by the release structure from the afterbay into the Middle Branch Escanaba River. Since January 1973, water is diverted immediately above this station (see sta 04057813) to Green Creek for iron ore processing and some returned via another Green Creek to Middle Branch Escanaba River 27 mi (43 km) below this station. During times when reservoir spills, flow bypasses this station and returns to the Middle Branch Escanaba River 0.5 mi (0.8 km) below this station.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge (prior to regulation), 290 ft³/s (8.21 m³/s) Oct. 1, 1972; (since regulation began), 63 ft³/s (1.78 m³/s) July 10, 11, 1974; minimum daily, 10 ft³/s (0.28 m³/s) Dec. 29, 30, 1972, result of construction.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	25	25	25	24	24	25	23	27	26	25	27
2	25	25	25	25	24	24	25	24	27	24	26	27
3	25	25	25	25	24	24	25	25	26	24	26	27
4	25	25	25	25	24	24	25	25	25	24	26	27
5	25	25	25	25	24	24	25	25	24	24	26	27
6	25	25	25	25	24	24	25	25	24	24	26	27
7	25	25	25	25	24	24	25	25	24	24	25	27
8	25	25	25	25	24	24	25	25	24	25	25	26
9	25	25	25	25	24	24	24	25	24	25	25	26
10	25	25	25	25	24	24	24	21	24	24	25	26
11	25	26	24	24	24	24	24	23	24	25	24	25
12	25	26	25	24	24	25	24	25	24	25	24	25
13	25	26	25	24	24	25	24	25	24	25	24	25
14	25	26	25	24	24	25	24	26	23	25	23	24
15	25	26	25	24	24	24	24	24	23	25	23	24
16	25	26	25	24	24	23	25	23	24	24	24	24
17	25	26	25	24	24	22	25	23	25	24	24	24
18	25	26	25	24	24	23	25	22	25	24	24	25
19	25	26	25	24	24	24	25	21	25	24	24	25
20	25	26	25	24	23	25	25	22	25	24	25	25
21	25	26	25	24	23	26	24	24	24	24	25	25
22	25	26	25	24	23	26	24	26	18	25	26	25
23	25	26	25	24	23	26	24	26	15	25	26	26
24	25	26	25	24	23	25	24	27	26	25	26	26
25	25	26	25	24	24	25	23	27	28	24	26	27
26	25	26	25	24	24	25	23	27	28	24	26	27
27	25	26	25	24	24	25	23	26	28	24	26	27
28	25	26	25	24	24	25	24	26	28	24	27	27
29	25	26	25	24	---	25	24	26	27	24	27	27
30	25	26	25	24	---	25	23	27	26	25	27	27
31	25	---	25	24	---	25	---	27	---	25	27	---
TOTAL	775	770	774	754	667	758	729	766	739	758	783	777
MEAN	25.0	25.7	25.0	24.3	23.8	24.5	24.3	24.7	24.6	24.5	25.3	25.9
MAX	25	26	25	25	24	26	25	27	28	26	27	27
MIN	25	25	24	24	23	22	23	21	15	24	23	24

CAL YR 1976 TOTAL 10774 MEAN 29.4 MAX 44 MIN 24
WTR YR 1977 TOTAL 9050 MEAN 24.8 MAX 28 MIN 15

04057814 GREENWOOD RELEASE NEAR GREENWOOD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: September 1973 to current year.

INSTRUMENTATION.--Temperature recorder since Sept. 1, 1973.

REMARKS.--Flow regulated by valve at outlet of Greenwood Afterbay.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES.--Maximum, 23.5°C July 14, 15, 1974; minimum, 1.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 22.0°C July 14; minimum, 1.0°C on several days during November, March, and April.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	14.0	12.5	5.0	4.5	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5
2	13.5	12.5	4.5	4.5	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5
3	13.5	12.5	4.5	3.5	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5
4	13.0	12.5	3.5	3.0	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5
5	12.5	12.5	3.0	3.0	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5
6	12.5	11.5	3.0	2.5	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5
7	11.5	11.0	2.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5
8	11.5	11.0	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5
9	11.5	11.0	2.0	1.5	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5
10	11.0	11.0	2.0	1.5	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5
11	11.0	10.0	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5
12	11.0	10.0	1.5	1.0	1.5	1.5	2.0	2.0	2.0	1.5	1.5	1.5
13	11.0	10.0	1.0	1.0	1.5	1.5	2.0	2.0	1.5	1.5	1.5	1.5
14	10.0	9.5	1.0	1.0	1.5	1.5	2.0	2.0	1.5	1.5	1.5	1.5
15	9.5	9.0	1.0	1.0	1.5	1.5	2.0	2.0	1.5	1.5	1.5	1.5
16	9.0	8.5	1.5	1.0	1.5	1.5	2.0	2.0	1.5	1.5	1.5	1.0
17	8.5	8.0	1.5	1.5	1.5	1.5	2.0	2.0	1.5	1.5	1.5	1.0
18	8.0	7.5	1.5	1.5	2.0	1.5	2.0	2.0	1.5	1.5	1.5	1.5
19	8.0	7.5	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5	1.5	1.5
20	8.0	7.5	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5	1.5	1.5
21	7.5	7.0	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5	2.0	1.5
22	7.0	6.5	1.5	1.0	2.0	2.0	2.0	2.0	1.5	1.5	2.0	2.0
23	6.5	6.0	1.0	1.0	2.0	2.0	2.0	2.0	1.5	1.5	2.0	2.0
24	6.5	6.0	1.5	1.0	2.0	2.0	2.0	2.0	1.5	1.5	2.0	2.0
25	6.5	6.0	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5	2.0	2.0
26	6.0	5.5	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5	2.0	2.0
27	5.5	5.0	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5	2.0	2.0
28	5.0	4.5	1.5	1.5	2.0	2.0	2.0	2.0	1.5	1.5	2.0	1.5
29	5.0	5.0	1.5	1.5	2.0	2.0	2.0	2.0	---	---	1.5	1.5
30	5.0	5.0	1.5	1.5	2.0	2.0	2.0	2.0	---	---	2.0	1.5
31	5.0	4.5	---	---	2.0	2.0	2.0	2.0	---	---	2.5	1.5
MONTH	14.0	4.5	5.0	1.0	2.0	1.5	2.0	2.0	2.0	1.5	2.5	1.0

04057814 GREENWOOD RELEASE NEAR GREENWOOD, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	2.5	2.0	11.0	9.5	15.0	15.0	16.5	15.5	18.0	16.0	18.0	16.5
2	2.0	1.5	12.5	9.5	17.5	15.0	19.0	15.5	19.0	16.5	17.0	16.5
3	2.0	1.5	11.5	9.5	17.5	15.0	18.5	16.0	19.5	16.5	17.0	15.5
4	2.0	1.0	11.0	10.5	19.0	16.0	18.5	16.5	18.5	17.0	17.0	16.0
5	1.0	1.0	12.5	10.5	16.5	16.0	18.5	16.5	18.5	17.5	16.5	16.0
6	2.0	1.0	13.0	12.5	18.0	15.5	20.5	18.5	18.5	16.5	16.5	15.5
7	2.0	2.0	13.5	10.5	17.0	16.0	21.0	19.0	19.5	17.0	16.5	15.5
8	2.0	2.0	13.0	10.5	18.0	16.0	20.0	18.0	19.5	17.5	16.5	16.0
9	2.0	2.0	13.0	11.0	18.0	15.5	19.0	16.5	18.5	16.5	16.5	16.0
10	2.5	2.0	13.5	11.0	16.5	16.0	18.5	17.0	19.0	17.0	16.5	15.0
11	4.0	2.5	15.0	11.5	16.5	16.0	18.5	17.0	17.5	16.5	16.0	15.0
12	4.5	3.0	16.0	13.5	17.5	16.0	19.5	18.0	18.5	16.0	16.0	15.0
13	5.0	3.5	16.0	13.5	17.5	16.0	18.5	17.5	19.5	17.0	16.5	15.5
14	4.5	3.0	16.0	13.5	17.5	16.0	22.0	17.5	18.5	16.5	17.0	15.0
15	4.5	4.0	18.0	13.5	17.5	16.0	20.0	19.0	18.0	16.5	16.0	15.0
16	6.5	4.0	18.5	13.5	16.5	16.0	20.0	17.5	17.0	16.5	15.5	15.5
17	5.5	4.0	17.0	13.5	18.5	16.0	20.5	17.5	17.0	16.0	15.5	15.5
18	5.5	5.0	18.0	14.0	17.5	16.5	19.0	17.5	18.0	16.0	16.0	15.5
19	8.0	5.0	15.5	13.0	19.0	16.5	21.5	18.0	19.0	16.0	15.5	15.0
20	8.5	6.5	14.0	12.5	20.0	17.0	20.5	18.5	17.5	16.5	15.0	14.0
21	9.5	6.5	14.0	13.0	21.5	17.5	21.5	17.5	18.0	16.5	15.0	13.5
22	9.0	6.0	14.5	13.0	20.0	18.0	20.0	16.5	17.5	16.0	14.5	14.0
23	9.0	6.5	15.0	13.0	18.5	12.5	20.5	17.5	17.5	16.0	14.0	14.0
24	7.5	6.0	16.0	13.5	14.0	12.0	21.5	17.5	18.0	15.5	14.0	13.5
25	9.5	5.5	17.0	14.5	15.5	13.5	20.0	17.0	17.0	15.5	14.0	13.5
26	9.5	6.5	17.0	15.0	15.5	14.0	19.5	16.0	17.0	17.0	14.0	13.5
27	9.0	7.0	16.5	15.0	17.0	15.5	18.5	16.0	17.5	17.0	13.5	13.0
28	10.5	6.5	17.5	15.0	16.5	15.5	18.0	16.0	18.5	17.5	14.0	13.0
29	10.5	7.5	16.5	15.0	17.5	15.0	19.5	16.0	18.0	16.5	14.0	13.5
30	12.5	9.0	16.5	15.0	17.0	16.0	18.0	16.0	17.5	16.5	13.5	13.0
31	---	---	15.5	15.0	---	---	18.5	17.0	18.5	17.0	---	---
MONTH	12.5	1.0	18.5	9.5	21.5	12.0	22.0	15.5	19.5	15.5	18.0	13.0

04057820 MIDDLE BRANCH ESCANABA RIVER NEAR GREENWOOD, MI

LOCATION.--Lat 46°25'12", long 87°47'50", in NW¼ sec.3, T.46 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on right bank 10 ft (3 m) downstream from county highway bridge, 100 ft (30 m) downstream from Bell Creek and 5.0 mi (8.0 km) southwest of Greenwood.

DRAINAGE AREA.--73.3 mi² (189.8 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1961-71, and annual maximum, water years 1970-72, October 1972 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,400 ft (427 m) from topographic map (nearest 10 ft). Prior to Sept. 20, 1973, nonrecording gage and crest-stage gage at same site and datum.

REMARKS.--Water-discharge record fair. Since December 1972, considerable regulation 2.1 mi (3.4 km) above station (see sta 04057814) and 2.6 mi (4.2 km) above station (see sta 04057811). Since January 1973, flow diverted 2.3 mi (3.7 km) above station at Greenwood Afterbay to Green Creek (see sta 04057813) for iron ore processing and some returned to Middle Branch Escanaba River 24 mi (39 km) below station via another Green Creek.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,060 ft³/s (30.0 m³/s) May 5, 1972, gage height, 13.35 ft (4.069 m); minimum daily, 12 ft³/s (0.34 m³/s) Dec. 28, 1972, Jan. 2-4, Nov. 5, 1973, result of construction upstream.

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 8.62 ft³/s (0.24 m³/s) was measured Aug. 22, 1962.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 67 ft³/s (1.90 m³/s) June 27, gage height, 8.49 ft (2.588 m); maximum gage height, 8.87 ft (2.704 m) Feb. 2, backwater from ice; minimum daily discharge, 18 ft³/s (0.51 m³/s) June 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	27	28	29	28	27	29	36	29	34	28	28	39
2	27	28	29	28	27	29	36	28	32	27	28	36
3	27	28	29	28	27	29	34	28	30	26	28	32
4	27	28	29	28	27	29	34	29	28	29	29	31
5	28	28	28	28	27	29	34	30	28	32	28	31
6	28	28	28	28	27	29	33	31	26	30	28	31
7	28	28	28	28	27	28	33	30	26	29	28	31
8	28	28	28	28	27	28	33	30	26	29	27	30
9	28	28	28	28	27	28	32	29	25	28	27	30
10	28	28	28	27	27	27	34	25	25	28	28	29
11	28	28	28	27	27	27	39	25	25	28	27	29
12	28	28	28	27	27	34	44	28	25	28	25	33
13	31	28	28	27	27	38	44	28	24	28	25	33
14	28	28	28	27	27	33	42	28	24	28	25	30
15	28	29	28	27	28	33	41	28	25	32	24	25
16	28	29	28	27	28	32	41	28	24	29	27	25
17	28	29	28	27	28	30	40	27	26	28	26	27
18	28	29	28	27	28	29	40	27	26	28	25	28
19	28	29	28	27	28	29	40	24	26	28	25	32
20	28	29	28	27	28	30	40	25	26	27	27	29
21	28	29	28	27	27	30	43	27	26	27	27	30
22	28	29	28	27	27	30	46	28	20	26	27	30
23	28	29	28	27	27	30	42	29	18	26	27	31
24	28	29	28	27	27	30	36	30	28	26	27	35
25	28	29	28	27	27	29	34	31	47	26	27	38
26	28	29	28	27	28	29	33	31	49	26	28	39
27	28	29	28	27	28	30	32	31	52	26	29	38
28	28	29	28	27	28	33	32	31	42	26	30	37
29	28	29	28	27	---	40	32	31	31	26	31	37
30	28	29	28	27	---	39	30	32	28	26	32	36
31	28	---	28	27	---	36	---	33	---	28	35	---
TOTAL	867	856	872	846	765	956	1110	891	872	859	855	962
MEAN	28.0	28.5	28.1	27.3	27.3	30.8	37.0	28.7	29.1	27.7	27.6	32.1
MAX	31	29	29	28	28	40	46	33	52	32	35	39
MIN	27	28	28	27	27	27	30	24	18	26	24	25

CAL YR 1976 TOTAL 26410 MEAN 72.2 MAX 962 MIN 27
WTR YR 1977 TOTAL 10711 MEAN 29.3 MAX 52 MIN 18

04057820 MIDDLE BRANCH ESCANABA RIVER NEAR GREENWOOD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1973 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: August 1973 to current year.

INSTRUMENTATION.--Temperature recorder since Aug. 22, 1973.

REMARKS.--Flow regulated by Greenwood Release (see sta 04057814) 2.1 mi (3.4 km) above station. In addition to the temperature recorder record, samples were collected once, in October.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 26.0°C July 8, 1974; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 24.0°C July 19; minimum, 0.0°C on many days during December to February.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (CA,MG) (MG/L)
OCT 20...	1400	24	67	7.1	5.5	6.5	65	26

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL IRON (FE) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL MANGANESE (MN) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)
OCT 20...	6.8	2.1	.07	1800	1300	190	170

04057820 MIDDLE BRANCH ESCANABA RIVER NEAR GREENWOOD, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	14.0	11.5	4.0	2.5	1.0	0.5	0.5	0.5	0.0	0.0	0.5	0.5
2	14.0	12.0	4.5	3.5	0.5	0.5	0.5	0.0	0.0	0.0	0.5	0.5
3	13.5	11.0	4.0	3.5	1.0	0.5	0.0	0.0	0.0	0.0	0.5	0.5
4	14.0	12.5	3.5	3.0	0.5	0.5	0.0	0.0	0.0	0.0	0.5	0.5
5	14.0	12.0	3.5	3.0	0.5	0.5	0.0	0.0	0.0	0.0	0.5	0.5
6	12.0	10.5	3.0	2.5	0.5	0.5	0.0	0.0	0.5	0.0	1.5	0.5
7	10.5	10.0	2.5	1.0	0.5	0.5	0.0	0.0	0.5	0.0	1.0	0.5
8	10.5	9.5	1.0	0.5	1.0	0.5	0.5	0.0	0.0	0.0	1.5	0.5
9	10.5	10.0	1.5	0.5	1.0	0.5	1.5	0.5	0.0	0.0	2.5	0.5
10	11.0	10.5	1.5	1.0	0.5	0.5	1.0	0.5	0.0	0.0	2.5	1.0
11	11.0	9.5	1.0	1.0	0.5	0.5	0.5	0.5	0.0	0.0	2.5	1.0
12	12.0	10.5	1.0	0.5	0.5	0.5	0.5	0.5	0.0	0.0	2.5	2.0
13	11.5	10.0	1.0	0.5	1.0	0.5	1.0	0.5	0.0	0.0	2.0	1.5
14	10.0	7.5	0.5	0.5	0.5	0.0	1.0	0.5	0.0	0.0	2.5	1.5
15	7.5	7.5	0.5	0.5	0.5	0.5	0.5	0.5	0.0	0.0	2.0	1.5
16	7.5	7.0	1.0	0.5	0.5	0.0	1.0	0.5	0.5	0.0	1.5	0.5
17	7.0	5.5	1.0	0.5	0.5	0.0	0.5	0.5	0.0	0.0	1.0	0.5
18	6.0	5.5	1.0	1.0	0.5	0.5	0.5	0.0	0.0	0.0	2.0	1.0
19	6.0	5.5	1.5	1.0	0.5	0.5	0.0	0.0	0.0	0.0	1.5	0.5
20	6.0	5.5	1.5	1.0	0.5	0.0	0.0	0.0	0.0	0.0	3.5	1.0
21	6.0	6.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	3.0	1.0
22	6.0	5.0	0.5	0.5	0.0	0.0	0.5	0.0	0.0	0.0	3.0	1.0
23	5.0	4.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	3.0	1.5
24	5.0	4.5	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.0
25	5.0	4.5	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	1.0
26	4.5	3.5	1.5	1.0	0.0	0.0	0.5	0.0	0.5	0.0	4.0	1.5
27	4.0	3.5	1.5	0.5	0.0	0.0	0.5	0.0	0.5	0.5	3.5	3.0
28	4.5	3.5	0.5	0.5	0.5	0.0	1.0	0.5	0.5	0.5	3.0	2.5
29	5.0	4.0	1.0	0.5	1.0	0.5	0.5	0.0	---	---	2.5	2.0
30	5.0	4.5	1.0	0.5	1.5	0.5	0.0	0.0	---	---	2.5	1.5
31	4.5	3.5	---	---	0.5	0.5	0.0	0.0	---	---	3.5	1.5
MONTH	14.0	3.5	4.5	0.5	1.5	0.0	1.5	0.0	0.5	0.0	4.0	0.5
DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	2.5	1.5	15.5	14.0	15.0	13.5	18.5	16.5	17.5	16.0	18.0	16.5
2	2.0	2.0	16.5	12.5	17.5	12.5	21.5	15.5	18.0	16.0	17.0	15.5
3	3.0	1.0	16.5	13.0	19.0	14.0	21.0	18.5	17.5	16.5	17.0	14.5
4	3.0	1.0	17.0	13.5	20.0	17.0	22.5	19.5	17.5	16.5	16.5	15.5
5	1.0	1.0	17.0	15.5	19.0	16.0	23.0	21.0	17.5	16.5	16.0	15.5
6	2.0	1.0	16.5	14.0	18.0	14.5	23.0	21.0	18.0	15.5	15.5	15.0
7	2.5	1.5	17.5	13.5	16.5	14.5	23.0	20.5	19.5	16.5	15.0	14.5
8	3.5	1.5	17.5	14.5	18.0	14.5	22.5	20.0	20.0	17.0	15.5	14.5
9	5.5	1.5	18.0	13.0	19.0	13.5	21.0	17.5	19.0	16.5	15.0	14.5
10	7.0	3.0	18.0	14.0	17.5	15.0	20.5	16.0	17.5	16.0	15.0	14.0
11	7.0	3.5	18.0	15.0	16.5	15.5	21.0	17.5	18.0	16.5	14.5	13.5
12	7.0	4.5	18.5	15.5	18.5	15.0	21.0	18.5	17.5	15.5	14.5	14.0
13	6.5	5.0	18.5	16.0	18.5	14.5	22.5	19.0	19.0	16.5	14.5	13.5
14	8.0	5.0	19.0	15.0	18.0	15.5	23.5	18.5	18.0	15.5	15.0	13.5
15	7.5	6.5	19.0	15.0	19.5	15.5	23.5	20.5	16.5	16.0	14.5	13.5
16	9.0	6.5	19.5	16.5	19.5	17.0	22.5	19.0	16.5	16.0	14.0	14.0
17	9.0	8.0	20.0	16.5	20.0	16.0	23.5	19.5	16.5	15.5	14.0	13.5
18	10.0	8.0	19.0	17.0	20.0	19.0	23.5	19.5	16.5	15.0	14.5	14.0
19	11.5	9.5	18.0	15.0	21.0	17.5	24.0	21.0	18.0	15.5	14.5	13.5
20	13.5	10.0	17.0	14.0	21.0	19.0	23.0	20.5	17.0	15.5	13.5	13.0
21	13.0	12.0	15.0	13.5	21.0	17.0	21.0	18.0	17.0	15.5	14.0	12.0
22	13.5	10.5	17.0	13.0	21.0	17.5	20.5	17.0	16.5	15.0	14.0	13.5
23	13.5	11.0	16.5	13.5	20.0	19.0	21.0	17.5	16.0	14.5	13.5	13.5
24	12.0	10.0	17.5	13.5	19.0	15.5	21.5	18.5	16.5	14.5	13.5	13.0
25	13.5	9.0	18.5	14.0	18.0	14.0	20.5	17.5	16.5	14.5	13.5	12.5
26	15.0	10.5	19.0	14.5	19.0	14.5	18.5	15.5	16.5	15.5	13.5	13.0
27	14.5	11.5	19.5	14.5	19.5	17.0	17.5	16.0	19.0	16.5	13.0	13.0
28	14.0	10.5	19.5	15.0	20.0	18.0	17.5	16.0	19.0	18.0	13.5	13.0
29	15.5	11.5	18.0	15.0	20.5	16.5	18.5	15.5	18.5	16.0	13.5	13.0
30	16.5	14.0	18.0	14.5	19.5	17.5	18.0	16.5	17.5	15.5	13.0	12.0
31	---	---	17.5	14.5	---	---	18.5	16.5	18.0	16.5	---	---
MONTH	16.5	1.0	20.0	12.5	21.0	12.5	24.0	15.5	20.0	14.5	18.0	12.0

04058000 MIDDLE BRANCH ESCANABA RIVER NEAR ISHPEMING, MI

LOCATION.--Lat 46°23'40", long 87°45'30", in NW¼ SW¼ sec.12, T.46 N., R.28 W., Marquette County, Hydrologic Unit 04030110, at former gaging station on left bank 0.5 mi (0.8 km) downstream from County Highway 581, 6 mi (10 km) southwest of Ishpeming, and 10 mi (16 km) east of Republic.

DRAINAGE AREA.--128 mi² (332 km²).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: August 1961 to September 1975, October 1976 to current year.

INSTRUMENTATION.--Temperature recorder since Aug. 24, 1961.

REMARKS.--Temperature recorder re-installed Oct. 14; clock stopped Mar. 30 to May 17 (range in temperature 0.0 to 19.0°C). Complete ice cover during winter period. Some regulation and diversion 6 mi (10 km) above station since December 1972.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 26.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 26.0°C July 19; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	---	---	3.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	---	---	4.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	---	---	4.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	---	---	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	---	---	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	---	---	3.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	---	---	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	---	---	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	---	---	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	---	---	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	---	---	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	---	---	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	---	---	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	---	---	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	7.0	6.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	7.0	6.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	6.5	5.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	5.5	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	5.5	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	5.5	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
21	5.5	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
22	5.5	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
23	4.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	4.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	4.5	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	4.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	3.5	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	3.5	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
29	4.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	---	---	0.5	0.0
30	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	---	---	---	---
31	4.0	3.0	---	---	0.0	0.0	0.0	0.0	---	---	---	---
MONTH	7.0	3.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0

04058000 MIDDLE BRANCH ESCANABA RIVER NEAR ISHPEMING, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1			---	---	16.0	14.5	18.5	15.0	19.0	16.5	17.5	17.0
2			---	---	17.0	13.5	19.5	15.0	18.5	16.5	17.0	15.5
3			---	---	18.5	14.5	20.0	18.0	18.5	17.0	15.0	13.5
4			---	---	20.5	17.5	21.0	19.0	17.5	16.5	15.0	15.0
5			---	---	20.5	17.5	22.0	20.0	18.0	17.5	15.0	14.5
6			---	---	18.5	15.5	23.0	22.0	18.5	16.0	14.5	14.0
7			---	---	17.5	15.0	24.0	22.0	19.5	17.5	14.0	13.5
8			---	---	17.5	14.5	24.0	22.0	19.5	17.5	14.5	14.0
9			---	---	18.0	14.5	23.0	19.5	19.5	16.5	14.5	14.0
10			---	---	17.5	14.5	21.0	17.0	17.5	16.5	14.5	13.0
11			---	---	16.5	15.5	21.0	19.0	17.5	16.0	14.0	12.5
12			---	---	17.5	14.5	21.0	20.0	16.0	14.0	13.0	13.0
13			---	---	17.5	14.5	22.5	20.0	18.0	16.0	13.5	13.0
14			---	---	17.5	15.0	24.0	21.0	18.0	15.0	13.5	12.0
15			---	---	18.5	15.5	23.0	21.0	16.0	15.0	13.0	12.0
16			---	---	18.5	17.0	23.0	21.5	15.0	15.0	12.5	12.5
17			---	---	19.0	16.0	23.0	21.5	15.0	14.0	13.0	12.5
18			22.0	19.0	19.0	18.5	24.0	22.0	15.0	13.0	14.0	13.0
19			21.0	18.5	19.5	17.0	26.0	23.0	16.0	14.0	14.0	13.0
20			20.5	18.0	20.5	17.5	25.5	24.0	16.0	14.0	13.0	12.0
21			19.0	17.0	20.5	16.5	24.0	21.0	16.0	15.0	12.0	11.0
22			19.0	16.5	20.0	16.5	22.5	18.5	15.5	13.5	12.0	12.0
23			19.0	17.0	20.0	18.5	22.5	19.5	14.5	12.5	12.0	12.0
24			19.5	16.0	19.5	18.5	22.5	20.5	15.0	12.5	12.0	12.0
25			20.0	16.0	18.5	15.5	22.5	19.5	15.0	12.5	12.0	12.0
26			20.0	16.5	19.5	16.0	20.5	17.5	15.5	15.0	12.0	12.0
27			21.0	17.0	19.5	17.5	19.5	19.0	17.5	15.5	12.0	12.0
28			20.5	17.5	19.5	18.5	19.0	17.5	18.5	17.5	12.5	12.0
29			20.0	16.5	20.5	17.5	19.5	17.0	17.5	15.5	12.5	12.5
30			19.0	16.0	20.5	18.0	19.5	17.0	17.0	15.5	12.5	11.5
31			19.0	16.0	---	---	19.0	17.5	17.0	16.5	---	---
MONTH			22.0	16.0	20.5	13.5	26.0	15.0	19.5	12.5	17.5	11.0

04058100 MIDDLE BRANCH ESCANABA RIVER NEAR PRINCETON, MI

LOCATION.--Lat 46°19'02", long 87°30'07", in NW¼ sec.12, T.45 N., R.26 W., Marquette County, Hydrologic Unit 04030110, on right bank 400 ft (122 m) downstream from powerplant, 0.3 mi (0.5 km) upstream from Green Creek, and 2.2 mi (3.5 km) northwest of Princeton.

DRAINAGE AREA.--210 mi² (544 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1961 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,100 ft (335 m) from topographic map (nearest 20 ft).

REMARKS.--Water-discharge record good. Flow regulated by powerplant above station. Since December 1972, additional regulation 27 mi (43 km) above station (see station 04057814). Since January 1973, flow diverted to Green Creek 27 mi (43 km) above station (see station 04057813) by industry for iron ore processing and some returned via another Green Creek 0.3 mi (0.5 km) below this station.

AVERAGE DISCHARGE.--16 years, 216 ft³/s (6.117 m³/s), 13.97 in/yr (355 mm/yr), adjusted for storage and diversion since December 1972.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,580 ft³/s (73.1 m³/s) May 6, 1972, gage height, 7.85 ft (2.393 m); minimum recorded, 2.2 ft³/s (0.062 m³/s) Oct. 5, 1964; minimum daily, 4.1 ft³/s (0.12 m³/s) Feb. 4, 1967.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 25 and 26, 1960, reached a stage of 10.5 ft (3.20 m) from floodmark, discharge, 3,850 ft³/s (109 m³/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 819 ft³/s (23.2 m³/s) Mar. 14, gage height, 4.14 ft (1.262 m); minimum, 5.1 ft³/s (0.14 m³/s) Nov. 2, gage height, 0.72 ft (0.219 m); minimum daily, 6.2 ft³/s (0.18 m³/s) Nov. 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	75	97	89	80	86	60	350	242	100	97	82	174
2	15	M0	91	80	86	80	308	135	101	97	82	184
3	19	99	91	80	86	90	302	108	101	97	82	137
4	114	99	78	81	86	90	220	108	101	97	82	139
5	142	99	78	80	86	90	190	110	101	97	82	140
6	128	99	76	81	86	90	195	110	101	98	82	251
7	120	99	76	82	86	90	192	110	101	99	82	215
8	48	97	76	82	86	90	195	110	101	99	82	130
9	18	95	78	84	86	90	192	110	101	99	82	130
10	23	28	78	86	86	90	192	108	105	99	82	130
11	89	6.2	78	86	60	90	200	112	111	99	82	130
12	148	6.8	78	86	60	100	320	112	111	99	82	130
13	130	7.9	78	86	60	200	407	112	111	97	82	130
14	115	9.6	78	86	60	576	457	110	111	89	82	131
15	44	60	78	86	60	570	476	112	111	178	82	130
16	14	93	80	86	54	288	480	112	111	138	83	130
17	16	89	81	86	60	118	452	108	106	132	84	130
18	108	91	81	86	60	182	434	113	99	280	85	130
19	142	91	80	86	60	200	416	106	99	202	85	133
20	140	66	77	86	60	192	395	94	99	62	85	134
21	120	66	74	86	60	175	392	93	99	62	85	195
22	66	62	78	86	60	158	438	94	96	62	85	180
23	6.4	66	78	86	60	155	444	94	95	64	85	180
24	6.7	66	79	86	60	155	410	101	85	64	84	181
25	67	66	77	86	60	152	375	111	94	64	85	226
26	97	67	77	86	60	152	368	106	94	70	85	373
27	97	68	79	86	60	152	228	99	95	78	84	293
28	97	70	78	86	60	155	250	99	97	84	84	243
29	97	70	80	86	---	290	310	99	97	84	84	274
30	97	87	80	86	---	407	250	99	97	82	84	263
31	97	---	80	86	---	386	---	100	---	82	85	---
TOTAL	2496.1	2100.5	2460	2622	1934	5713	9838	3437	3031	3151	2582	5346
MEAN	80.5	70.0	79.4	84.6	69.1	184	328	111	101	102	83.3	178
MAX	148	99	91	86	86	576	480	242	111	280	85	373
MIN	6.4	6.2	74	80	54	60	190	93	85	62	82	130

CAL YR 1976 TOTAL 71751.6 MEAN 196 MAX 1720 MIN 6.2 MEAN+ 188 CFSM+ 0.90 IN+ 12.16
WTR YR 1977 TOTAL 44710.6 MEAN 122 MAX 576 MIN 6.2 MEAN+ 140 CFSM+ 0.67 IN+ 9.05
+Adjusted for diversion and change in contents in Greenwood Reservoir.

04058100 MIDDLE BRANCH ESCANABA RIVER NEAR PRINCETON, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1963, 1965, 1967 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (CA,MG) (MG/L)
OCT								
14...	1130	103	94	7.7	2.0	8.0	30	44
NOV								
22...	1505	93	115	7.2	-3.0	1.0	25	43
DEC								
17...	1040	108	104	7.5	-2.0	.0	30	55
JAN								
20...	1020	111	98	7.3	-4.5	.5	30	49
FEB								
17...	1030	E110	106	7.3	-3.5	.5	30	46
MAR								
15...	1100	572	90	7.3	3.5	.5	40	38
APR								
18...	1430	434	71	7.1	18.0	9.5	50	26
MAY								
18...	1330	113	91	7.6	26.5	22.0	30	53
JUN								
20...	1100	91	110	7.5	15.0	19.0	20	46
JUL								
21...	1000	62	103	7.1	22.0	24.5	120	50
AUG								
24...	1030	84	93	7.4	13.0	15.5	50	45

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL IRON (FE) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL MANGANESE (MN) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)
OCT							
14...	11	4.0	.04	1000	580	60	50
NOV							
22...	12	3.1	.08	780	600	30	20
DEC							
17...	15	4.2	.10	850	610	40	30
JAN							
20...	13	4.1	.12	1100	530	90	80
FEB							
17...	12	3.9	.15	1200	520	70	60
MAR							
15...	9.2	3.7	.70	1100	440	190	180
APR							
18...	6.0	2.6	.39	470	210	60	40
MAY							
18...	12	5.6	.13	540	250	100	50
JUN							
20...	12	3.9	.10	770	330	130	100
JUL							
21...	13	4.2	.08	1500	1300	430	340
AUG							
24...	12	3.6	.06	1000	740	80	60

04058120 GREEN CREEK NEAR PALMER, MI

LOCATION.--Lat 46°22'22", long 87°36'21", in NW¼ sec.19, T.46 N., R.26 W., Marquette County, Hydrologic Unit 04030110, at culvert on County Road 565, 4.5 miles (7.2 km) south of Palmer.

DRAINAGE AREA.--8.42 mi² (21.81 km²).

PERIOD OF RECORD.--Water years 1964-65, 1969 to current year.

REMARKS.--Since 1970, industrial diversion into headwaters from Schweitzer Reservoir (see station 04058190), for iron ore processing.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (CA,MG) (MG/L)
OCT								
20...	1145	6.4	424	8.1	2.5	4.0	10	110
NOV								
24...	1015	12	480	7.9	-9.0	1.0	12	120
DEC								
17...	0900	19	524	8.2	-2.0	.5	9	120
JAN								
19...	1450	18	550	8.1	-3.5	.0	5	150
FEB								
16...	1430	14	550	7.9	-1.0	.0	3	110
MAR								
15...	1235	33	492	8.0	4.0	2.0	10	110
APR								
19...	1030	21	285	7.7	19.0	8.0	3	65
MAY								
17...	1500	8.4	343	8.3	25.0	24.0	0	98
JUN								
20...	1315	3.3	418	8.0	20.5	20.0	5	93
JUL								
21...	0915	3.4	396	8.3	18.0	21.0	50	93
AUG								
24...	1355	2.4	400	8.1	20.0	15.0	35	98

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL IRON (FE) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL MANGANESE (MN) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)
OCT							
20...	18	15	.04	360	100	70	40
NOV							
24...	18	17	.37	300	70	80	40
DEC							
17...	20	18	.67	320	70	190	170
JAN							
19...	17	27	.83	280	70	430	420
FEB							
16...	16	18	1.0	350	50	540	500
MAR							
15...	15	17	1.1	600	100	--	530
APR							
19...	11	9.1	.50	370	100	250	210
MAY							
17...	18	13	.05	250	40	160	50
JUN							
20...	16	13	.12	460	70	170	60
JUL							
21...	16	13	.05	180	140	--	100
AUG							
24...	18	13	.00	700	210	150	60

04058130 GREEN CREEK NEAR PRINCETON, MI

LOCATION.--Lat 46°20'02", long 87°31'58", in SW¼ SW¼ sec.35, T.46 N., R.26 W., Marquette County, Hydrologic Unit 04030110, near left bank at upstream side of bridge on State Highway 35, 3.0 mi (4.8 km) upstream from mouth, 4.0 mi (6 km) northwest of Princeton.

DRAINAGE AREA.--13.8 mi² (35.7 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1961-65, 1971. October 1976 to September 1977.

GAGE.--Nonrecording gage. Datum of gage is 1166.71 ft (355.613 m) above mean sea level.

REMARKS.--Water-discharge records fair. Regulation by tailings ponds in headwaters.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 51 ft³/s (1.44 m³/s) Apr. 14; minimum daily, 6.8 ft³/s (0.19 m³/s) Aug. 12, 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	11	18	18	14	14	20	14	13	22	7.8	15
2	24	12	18	18	14	14	20	13	18	20	7.6	14
3	18	12	18	18	14	14	25	13	15	28	7.6	14
4	15	14	19	18	14	15	19	12	17	12	7.9	15
5	14	11	19	17	13	15	29	12	8.8	20	7.7	15
6	14	11	20	18	13	15	33	13	9.5	13	7.7	16
7	14	13	20	18	12	15	27	12	8.4	11	8.0	16
8	13	16	20	18	12	15	23	12	7.8	11	7.4	15
9	13	13	21	18	12	15	15	12	7.7	11	7.2	14
10	12	13	21	19	13	15	42	12	7.4	12	7.6	13
11	12	13	21	19	13	15	48	12	7.5	11	7.0	12
12	12	13	21	19	13	16	49	12	7.4	11	6.8	16
13	12	13	21	19	13	20	44	12	7.1	10	7.3	14
14	12	13	21	19	13	30	51	13	7.0	10	7.2	12
15	12	13	21	18	13	40	48	13	7.0	21	6.9	12
16	12	13	20	19	12	32	45	13	7.1	12	9.2	12
17	12	13	20	18	11	27	32	14	7.2	12	8.6	13
18	12	13	20	18	11	23	33	14	7.4	13	8.0	13
19	12	13	20	18	11	21	38	13	7.3	11	7.4	30
20	12	13	20	17	13	19	33	14	7.2	10	6.9	25
21	12	13	20	17	13	18	34	15	7.3	9.0	7.6	18
22	12	13	20	16	13	17	33	16	7.2	8.3	7.4	16
23	12	13	20	15	13	16	32	17	7.5	7.7	7.2	25
24	12	14	20	15	14	15	23	16	7.6	8.6	7.0	29
25	12	16	20	15	15	13	19	16	18	8.6	6.9	31
26	11	14	20	15	15	15	17	15	25	7.8	6.8	35
27	11	14	20	14	15	17	17	15	27	7.6	7.4	24
28	11	13	20	14	14	19	15	14	26	7.8	7.6	22
29	11	14	19	14	---	40	14	12	24	7.8	7.5	21
30	11	16	18	14	---	40	14	12	25	7.8	8.2	23
31	12	---	18	14	---	21	---	13	---	8.4	16	---
TOTAL	408	396	614	527	366	621	892	416	359.4	370.4	241.4	550
MEAN	13.2	13.2	19.8	17.0	13.1	20.0	29.7	13.4	12.0	11.9	7.79	18.3
MAX	24	16	21	19	15	40	51	17	27	28	16	35
MIN	11	11	18	14	11	13	14	12	7.0	7.6	6.8	12

WTR YR 1977 TOTAL 5761.2 MEAN 15.8 MAX 51 MIN 6.8

04058130 GREEN CREEK NEAR PRINCETON, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: January to September 1977.

INSTRUMENTATION.--Temperature recorder since Jan. 20, 1977.

REMARKS.--Daily record is mid-day value from recorder graph or once daily observer's readings. Record for the period Jan. 1-19 was based on known temperatures of 0.0°C, when the stream was ice covered. No recorder or observer readings for June 15. Temperature recorder vandalized; no record Apr. 23 to May 16. Intermittent ice cover during winter period. Since 1970, diversion into headwaters from Schweitzer Reservoir (see station 04058190), via iron-ore processing.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum daily, 23.0°C July 20, 1977; minimum daily, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1				0.0	0.0	0.0	0.5	---	14.0	15.0	15.0	16.0
2				0.0	0.0	0.0	0.5	---	12.0	15.5	14.5	16.0
3				0.0	0.0	0.0	0.5	---	13.0	16.0	14.5	15.5
4				0.0	0.0	0.0	1.5	---	15.5	17.0	15.0	15.0
5				0.0	0.0	0.0	0.0	---	14.0	18.5	15.0	15.0
6				0.0	0.0	0.0	0.0	---	13.0	21.0	14.0	15.0
7				0.0	0.0	0.0	0.0	---	12.5	20.5	17.0	15.0
8				0.0	0.0	0.0	0.0	---	12.0	20.0	16.5	14.0
9				0.0	0.0	0.0	0.0	---	11.5	16.0	16.5	16.0
10				0.0	0.0	0.0	2.5	---	11.0	16.0	16.0	15.0
11				0.0	0.0	0.0	4.0	---	11.5	17.0	16.0	14.0
12				0.0	0.0	0.0	4.5	---	11.5	16.5	15.0	14.0
13				0.0	0.0	0.0	5.5	---	11.0	18.0	15.0	14.0
14				0.0	0.0	0.0	3.5	---	14.0	18.0	14.0	13.0
15				0.0	0.0	0.0	7.0	---	---	20.0	12.0	14.0
16				0.0	0.0	0.0	7.0	---	15.5	20.0	12.5	14.0
17				0.0	0.0	0.0	9.5	21.0	15.0	20.5	12.0	14.0
18				0.0	0.0	0.0	8.5	19.0	15.0	19.5	12.0	14.0
19				0.0	0.0	0.0	9.5	17.5	18.5	20.0	12.0	14.0
20				0.0	0.0	0.0	11.0	17.5	15.5	23.0	11.0	12.0
21				0.0	0.0	0.0	12.0	16.5	15.5	22.0	12.0	12.5
22				0.0	0.0	0.0	8.5	18.0	15.0	17.5	12.5	12.5
23				0.0	0.0	0.0	---	17.0	17.0	15.5	10.0	12.0
24				0.0	0.0	0.5	---	17.0	17.0	20.0	9.0	12.5
25				0.0	0.0	0.5	---	17.0	14.5	19.0	8.5	12.0
26				0.0	0.0	0.0	---	18.0	20.0	16.0	14.0	11.0
27				0.0	0.0	1.5	---	18.0	21.0	15.5	15.0	12.0
28				0.0	0.0	2.0	---	19.0	20.0	17.0	16.0	13.0
29				0.0	---	1.5	---	17.0	20.5	16.0	15.0	13.0
30				0.0	---	1.0	---	16.0	19.0	15.0	16.0	12.0
31				0.0	---	2.5	---	16.0	---	16.5	17.0	---
MAX				0.0	0.0	2.5	12.0	21.0	21.0	23.0	17.0	16.0
MIN				0.0	0.0	0.0	0.0	16.0	11.0	15.0	8.5	11.0

04058190 SCHWEITZER RESERVOIR NEAR PALMER, MI

LOCATION.--Lat 46°25'00", long 87°38'48", in SE¼ NW¼ sec.2, T.46 N., R.27 W., Marquette County, Hydrologic Unit 04030110, on left bank 120 ft (36 m) upstream from dam on Schweitzer Creek, and 3.0 mi (4.8 km) southwest of Palmer.

DRAINAGE AREA.--23.1 mi² (59.8 km²).

PERIOD OF RECORD.--January 1963 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is 1,300.00 ft (396.240 m) above mean sea level (Cleveland-Cliffs Iron Co. bench mark). Gage readings have been converted to elevations above mean sea level. Prior to Oct. 25, 1967, nonrecording gage at same site and datum.

REMARKS.--Reservoir is formed by an earthfill dam with fixed crest concrete spillway completed in 1963. Usable capacity of reservoir is 5,300 acre-ft (6.53 hm³) at spillway elevation 1,338.00 ft (407.822 m). The dam includes a discharge pipe equipped with valve to control release flow to Schweitzer Creek (see station 04058200). An average of 3.0 ft³/s (0.085 m³/s) was diverted from the headwaters of basin by the city of Ishpeming for municipal supply and the effluent discharged to the Carp River basin. An average of 25 ft³/s (0.71 m³/s) was diverted from reservoir for iron ore processing and some returned to the Middle Branch Escanaba River basin by Green Creek. Since January 1973, controlled diversion from Greenwood Reservoir (see station 04057811) via Greenwood Diversion (see station 04057813) into Schweitzer Reservoir. Controlled inflow averaged 12.6 ft³/s (0.36 m³/s) for the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents recorded, 5,900 acre-ft (7.27 hm³) May 31, 1970, elevation, 1,339.5 ft (408.28 m); minimum recorded since first filling, 2,920 acre-ft (3.60 hm³) Apr. 10, 1974, elevation, 1,329.7 ft (405.29 m).

EXTREMES FOR CURRENT YEAR.--Maximum contents, 5,420 acre-ft (6.68 hm³) Sept. 25, elevation, 1,338.3 ft (407.91 m); minimum, 3,200 acre-ft (3.95 hm³) May 31, elevation, 1,330.8 ft (405.63 m).

MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

Date	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in ft³/s)
Sept. 30	1334.4	4170	--	--
Oct. 31	1335.7	4560	+390	+6.3
Nov. 30	1335.9	4620	+60	+1.0
Dec. 31	1335.0	4350	-270	-4.4
CAL YR 1976	--	--	-850	-1.2
Jan. 31	1333.0	3750	-600	-9.8
Feb. 28	1332.0	3500	-250	-4.5
Mar. 31	1334.0	4050	+550	+8.9
Apr. 30	1336.4	4770	+720	+12.1
May 31	1330.8	3200	-1570	-25.5
June 30	1334.0	4050	+850	+14.3
July 31	1337.0	4950	+900	+14.6
Aug. 31	1337.6	5160	+210	+3.4
Sept. 30	1338.1	5340	+180	+3.0
WTR YR 1977	--	--	+1170	+1.6

04058200 SCHWEITZER CREEK NEAR PALMER, MI

LOCATION.--Lat 46°24'40", long 87°37'27", in SW¼ sec.1, T.46 N., R.27 W., Marquette County, Hydrologic Unit 04030110, on right bank 10 ft (3 m) upstream from highway bridge, 2.5 mi (4.0 km) southwest of Palmer.

DRAINAGE AREA.--23.6 mi² (61.1 km²).

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Concrete control since Oct. 1, 1963. Altitude of gage is 1,270 ft (387 m) from topographic map (nearest 10 ft). Prior to Aug. 21, 1961, nonrecording gage at same site and datum.

REMARKS.--Records good. Since August 1962, flow completely regulated by Schweitzer Reservoir (see sta 04058190), 1.0 mi (1.6 km) above station. An average of 3.0 ft³/s (0.085 m³/s) was diverted from headwaters of basin by the city of Ishpeming for municipal supply and the effluent discharged to the Carp River basin. An average of 25 ft³/s (0.71 m³/s) was diverted from Schweitzer Reservoir by industry for iron ore processing and some returned to the Middle Branch Escanaba River via Green Creek. Diversion into Schweitzer Reservoir from Greenwood Reservoir via Greenwood Diversion (see sta 04057813). Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 860 ft³/s (24.4 m³/s) May 31, 1970, gage height, 6.50 ft (1.981 m); minimum, 0.4 ft³/s (0.011 m³/s) Sept. 6, 1962, gage height, 1.22 ft (0.372 m); minimum daily, 1.0 ft³/s (0.028 m³/s) Apr. 9-18, May 5, 6, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 62 ft³/s (1.76 m³/s) Sept. 25, gage height, 3.74 ft (1.140 m); minimum, 2.0 ft³/s (0.057 m³/s) Aug. 11, 12, gage height, 2.68 ft (0.817 m); minimum daily, 3.6 ft³/s (0.10 m³/s) Feb. 28, Mar. 3, 5.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.2	4.2	4.2	4.0	3.8	3.9	4.5	4.7	4.7	4.3	4.4	4.8
2	4.1	4.2	4.2	4.0	3.8	4.6	4.5	4.6	4.1	4.1	4.4	4.7
3	4.2	4.2	4.2	4.0	3.8	3.6	4.4	4.5	4.0	4.3	4.8	4.7
4	4.2	4.3	4.2	4.0	3.8	3.7	4.4	4.5	4.0	4.5	4.6	12
5	4.3	4.2	4.2	4.0	3.8	3.6	4.6	4.7	4.0	4.7	4.6	24
6	4.2	4.2	4.1	4.0	3.8	3.7	4.2	4.5	4.1	4.2	4.5	28
7	4.3	4.2	3.9	4.0	3.8	3.7	4.2	4.5	4.0	4.2	4.5	29
8	4.3	4.2	3.8	4.0	3.8	3.7	4.2	4.4	4.0	4.1	4.5	24
9	4.2	4.2	4.0	4.0	3.8	3.9	4.5	4.5	4.0	4.0	4.6	25
10	4.2	4.2	4.1	4.0	3.9	3.8	5.1	4.4	3.9	4.0	3.8	18
11	4.3	4.2	4.0	4.0	3.8	3.9	5.7	4.4	3.9	4.0	4.1	14
12	4.2	4.3	4.0	4.0	3.8	6.2	5.6	4.3	4.0	4.1	4.5	16
13	4.2	4.2	4.0	3.8	3.8	6.1	6.0	4.3	4.0	4.0	4.6	15
14	4.3	4.2	4.0	3.8	3.8	5.8	5.1	4.3	3.9	5.8	4.5	12
15	4.3	4.2	4.0	3.8	3.8	5.4	5.5	4.2	3.9	5.3	4.6	10
16	4.3	4.0	4.1	3.8	3.8	4.5	5.1	4.4	3.9	4.7	5.1	11
17	4.3	4.1	4.1	3.8	3.8	4.3	5.1	4.2	4.0	4.6	4.6	12
18	4.3	4.2	4.2	3.8	3.8	4.2	5.0	4.1	4.0	4.6	4.5	12
19	4.4	4.2	4.2	3.8	3.8	4.2	5.1	4.4	3.9	4.4	4.5	20
20	4.3	4.2	4.1	3.8	3.8	4.3	4.9	4.5	3.9	4.2	4.5	27
21	4.3	4.2	4.0	3.8	3.8	4.2	6.1	4.5	3.8	4.2	4.5	23
22	4.4	4.2	4.0	3.8	3.8	4.1	5.3	4.2	3.8	4.2	4.5	20
23	4.2	4.2	4.0	3.8	3.7	4.1	5.0	4.0	3.9	4.2	4.5	23
24	4.3	4.2	4.0	3.8	3.7	4.0	4.9	4.0	5.6	4.2	4.5	33
25	4.3	4.3	4.0	3.9	3.8	4.0	4.9	4.0	4.4	4.2	4.5	55
26	4.4	4.2	4.0	3.8	3.8	4.1	4.8	3.9	4.0	4.2	4.5	56
27	4.3	4.2	4.0	3.8	3.8	4.5	4.8	3.9	4.8	4.2	4.6	43
28	4.3	4.2	4.0	3.8	3.6	5.3	4.7	3.9	4.4	4.4	4.4	32
29	4.3	4.2	4.0	3.8	---	6.0	4.7	3.8	4.1	4.3	4.5	28
30	4.3	4.2	4.0	3.8	---	5.1	4.8	3.8	4.2	4.3	4.4	25
31	4.2	---	4.0	3.8	---	4.7	---	4.3	---	4.8	6.8	---
TOTAL	132.4	126.0	125.6	120.2	106.0	137.2	147.7	132.7	123.2	135.3	141.9	661.2
MEAN	4.27	4.20	4.05	3.88	3.79	4.43	4.92	4.28	4.11	4.36	4.58	22.0
MAX	4.4	4.3	4.2	4.0	3.8	6.2	6.1	4.7	5.6	5.8	6.8	56
MIN	4.1	4.0	3.9	3.8	3.6	3.6	4.2	3.8	3.8	4.0	3.8	4.7

CAL YR 1976 TOTAL 5051.6 MEAN 13.8 MAX 145 MIN 3.8
WTR YR 1977 TOTAL 2089.4 MEAN 5.72 MAX 56 MIN 3.6

04058250 WARNER CREEK TRIBUTARY NEAR PALMER, MI

LOCATION.--Lat 46°25'20", long 87°36'09", in NW¼ SE¼ sec.31, T.47 N., R.26 W., Marquette County, Hydrologic Unit 04030110, at double culvert on County Road 565, 0.3 mile (0.5 km) upstream from mouth, and 0.8 mile (1.3 km) south of Palmer.

DRAINAGE AREA.--4.05 mi² (10.49 km²).

PERIOD OF RECORD.--Water years 1972 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (CA,MG) (MG/L)
OCT								
20...	1330	.93	260	7.3	4.0	2.5	12	110
NOV								
24...	0930	2.0	350	7.2	-9.0	.0	20	150
DEC								
16...	1500	.28	320	7.5	.0	.0	17	130
JAN								
19...	1530	.27	370	7.5	-3.5	.0	20	110
FEB								
16...	1500	.21	270	7.5	-2.0	.0	15	100
MAR								
15...	1300	13	236	7.1	5.0	.5	40	94
APR								
19...	1230	8.2	178	6.9	22.0	10.0	40	60
MAY								
17...	1700	2.6	311	7.6	27.0	21.5	0	140
JUN								
20...	1500	1.7	320	7.5	23.0	19.0	5	140
JUL								
19...	1500	2.9	305	7.5	35.0	25.5	80	140
AUG								
24...	1430	1.5	348	7.6	18.0	14.0	20	150

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL IRON (FE) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL MANGANESE (MN) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)
OCT							
20...	26	11	.07	780	130	130	100
NOV							
24...	34	15	.10	680	30	190	150
DEC							
16...	31	13	.09	890	130	310	260
JAN							
19...	27	11	.09	700	300	360	360
FEB							
16...	25	9.1	.11	770	170	210	190
MAR							
15...	21	10	.92	820	220	310	300
APR							
19...	14	6.1	.33	650	170	80	60
MAY							
17...	33	13	.15	600	180	120	70
JUN							
20...	32	15	.00	330	130	100	100
JUL							
19...	34	13	.04	1000	780	340	340
AUG							
24...	35	14	.01	410	250	80	70

04058300 WARNER CREEK NEAR PALMER, MI

LOCATION.--Lat 46°24'09", long 87°32'39", in NW¼ sec.10, T.46 N., R.26 W., Marquette County, Hydrologic Unit 04030110, on left bank 10 ft (3 m) upstream from bridge on county highway, 0.1 mi (0.2 km) upstream from confluence with Schweitzer Creek, and 3.5 mi (5.6 km) southeast of Palmer.

DRAINAGE AREA.--14.2 mi² (36.8 km²).

PERIOD OF RECORD.--July 1961 to September 1968, October 1972 to current year. Occasional low-flow measurements, water years 1969-70, and annual maximum, water-years 1970-72.

GAGE.--Water-stage recorder. Altitude of gage is 1,190 ft (363 m) from topographic map (nearest 10 ft). Prior to Aug. 22, 1961, non-recording gage at present site and datum.

REMARKS.--Records poor. Headwaters are affected by waste effluent and mine pumpage. Discharge during the year includes flow resulting from the dewatering of Gribben Lake basin 1.0 mi (1.6 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--7 years, (water years 1962-68), 15.8 ft³/s (0.447 m³/s), 15.11 in/yr (384 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 600 ft³/s (17.0 m³/s) May 31, 1970, gage height, 8.95 ft (2.728 m), backwater from Schweitzer Creek; minimum discharge, 0.5 ft³/s (0.014 m³/s) Sept. 10, 1961, gage height, 0.79 ft (0.241 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 160 ft³/s (4.53 m³/s) Apr. 13, gage height, 3.71 ft (1.131 m); minimum daily discharge, 2.9 ft³/s (0.082 m³/s) Nov. 29.

REVISIONS.--Revised figures of discharge, in cubic feet per second, for period Sept. 15-30, 1976. These figures supersede those published in the report for 1976.

Sept. 15	22	Sept. 19	19	Sept. 23	22	Sept. 27	22
16	21	20	20	24	20	28	21
17	20	21	35	25	20	29	21
18	19	22	24	26	21	30	21

Month	Total	Mean	Max	Min
September 1976	415.0	13.8	35	2.3
Wtr Yr 1976	6,421.6	17.6	115	2.3

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	21	12	8.0	11	8.0	71	28	39	24	13	38
2	20	21	12	7.8	13	7.4	61	24	29	19	11	22
3	20	21	12	7.4	15	7.5	58	20	21	19	12	15
4	20	21	12	7.0	15	8.0	52	19	17	23	15	21
5	10	21	12	7.0	15	7.8	45	23	16	33	13	31
6	7.0	21	12	7.2	15	7.8	51	23	24	29	11	32
7	3.5	21	13	7.6	15	9.1	47	25	19	20	10	37
8	17	21	14	8.0	15	9.1	46	30	15	18	9.5	29
9	17	21	14	9.0	15	12	47	20	12	13	9.7	24
10	13	21	14	10	9.0	14	70	20	11	11	13	23
11	10	21	14	12	5.3	16	122	26	12	10	11	16
12	5.0	21	14	13	5.4	41	139	21	11	11	11	22
13	3.8	21	14	15	5.5	77	153	17	11	10	12	22
14	3.5	21	14	17	5.5	90	121	11	9.5	19	11	18
15	3.5	21	14	18	5.5	102	101	9.9	9.3	91	7.8	16
16	3.5	21	14	20	5.6	91	96	12	10	39	12	18
17	20	21	14	20	5.6	82	82	15	10	25	11	23
18	20	21	14	20	5.2	69	75	15	11	21	8.4	20
19	20	21	14	20	5.0	66	75	15	11	16	6.6	22
20	20	21	14	20	5.0	59	68	20	10	14	6.1	30
21	20	21	14	20	5.0	56	80	41	9.7	12	5.9	19
22	20	21	14	20	4.3	55	102	27	9.6	11	6.0	10
23	5.0	21	13	13	3.1	52	72	18	8.9	11	6.0	12
24	15	21	12	6.0	11	47	59	14	17	10	5.7	25
25	21	10	11	3.3	8.6	42	52	11	40	9.8	5.4	70
26	21	4.0	11	3.3	8.1	44	45	10	18	9.4	6.4	76
27	21	3.2	10	3.3	7.8	59	38	10	24	8.5	8.8	54
28	21	3.0	9.5	3.4	7.5	72	35	10	49	9.8	12	30
29	21	2.9	9.0	3.5	---	136	31	9.5	33	9.9	9.7	19
30	21	12	8.5	3.8	---	130	32	9.9	24	11	7.7	15
31	21	---	8.5	4.5	---	93	---	11	---	15	42	---
TOTAL	464.8	539.1	387.5	338.1	247.0	1569.7	2126	565.3	541.0	582.4	329.7	809
MEAN	15.0	18.0	12.5	10.9	8.82	50.6	70.9	18.2	18.0	18.8	10.6	27.0
MAX	21	21	14	20	15	136	153	41	49	91	42	76
MIN	3.5	2.9	8.5	3.3	3.1	7.4	31	9.5	8.9	8.5	5.4	10

CAL YR 1976 TOTAL 6416.2 MEAN 17.5 MAX 115 MIN 2.3
WTR YR 1977 TOTAL 8499.6 MEAN 23.3 MAX 153 MIN 2.9

04058400 GOOSE LAKE OUTLET NEAR SANDS STATION, MI

LOCATION.--Lat 46°23'36", long 87°29'40", in SE¼ SE¼ sec.12, T.46 N., R.26 W., Marquette County, Hydrologic Unit 04030110, on left bank 0.8 mi (1.3 km) upstream from mouth, and 3 mi (5 km) west of Sands Station.

DRAINAGE AREA.--37.5 mi² (97.1 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,160 ft (354 m) from topographic map (nearest 10 ft).

REMARKS.--Water-discharge record good. Some mine-water pumped into basin at headwaters.

AVERAGE DISCHARGE.--10 years (water years 1966-75), 32.8 ft³/s (0.929 m³/s), 11.88 in/yr (302 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 458 ft³/s (13.0 m³/s) May 31, 1970, gage height, 5.89 ft (1.795 m); minimum, 3.7 ft³/s (0.105 m³/s) Oct. 10, 1976, Jan. 22, Feb. 14 and part or all of each day Feb. 16-23, Feb. 26 to Mar. 8, 1977, gage height, 1.35 ft (0.411 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 171 ft³/s (4.84 m³/s) Apr. 13, gage height, 3.92 ft (1.195 m); minimum, 3.7 ft³/s (0.105 m³/s) Oct. 10, Jan. 22, Feb. 14 and part or all of each day Feb. 16-23, Feb. 26 to Mar. 8, gage height, 1.35 ft (0.411 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.3	4.2	4.2	4.0	3.9	3.7	89	39	21	14	9.9	11
2	5.8	4.2	4.1	4.0	3.9	3.7	89	36	23	13	9.2	10
3	4.3	4.2	4.1	4.7	3.9	3.8	80	33	24	13	10	11
4	4.2	4.4	4.1	4.1	3.9	3.9	73	31	24	14	10	13
5	4.3	4.3	4.1	4.0	3.9	3.9	53	31	22	15	9.3	12
6	4.3	4.7	4.2	4.0	3.9	3.8	74	29	25	14	8.7	14
7	4.4	4.4	4.2	4.0	3.9	3.8	61	27	22	14	8.3	14
8	4.4	4.2	4.0	4.0	3.9	3.8	51	26	20	14	7.8	13
9	5.0	4.3	4.0	4.0	3.9	4.1	50	24	19	12	7.4	12
10	4.2	4.3	4.1	4.0	3.9	4.1	51	23	17	11	8.5	11
11	4.1	4.3	4.1	4.0	3.9	4.1	60	22	16	10	8.1	11
12	4.2	4.3	4.1	3.9	3.9	8.8	103	21	16	11	7.3	12
13	4.2	4.3	4.0	3.9	3.9	7.2	156	20	14	9.4	7.7	10
14	4.2	4.3	4.0	3.9	3.9	6.2	161	19	13	14	7.1	9.8
15	4.4	4.2	4.1	3.9	3.9	6.1	159	18	12	25	6.7	9.0
16	4.5	4.3	4.1	3.9	3.9	5.0	144	18	12	24	8.6	9.4
17	4.5	4.3	4.1	3.9	3.8	4.5	131	17	12	31	7.9	9.7
18	4.4	4.3	4.2	3.9	3.8	6.5	116	18	11	28	7.3	9.0
19	4.3	4.3	4.2	3.9	3.8	16	104	17	11	25	6.9	16
20	4.2	4.3	4.2	3.9	3.7	22	92	19	10	22	6.6	14
21	4.2	4.3	4.2	3.9	3.8	27	91	24	8.5	20	6.2	15
22	4.3	4.2	4.1	3.9	3.7	27	94	24	7.7	18	6.0	16
23	4.2	4.2	4.0	3.9	3.8	23	93	23	7.8	17	5.6	17
24	4.2	4.2	4.1	4.0	4.1	23	84	21	9.3	15	5.1	18
25	4.3	4.3	4.0	3.9	4.0	23	75	19	9.9	14	4.8	21
26	4.2	4.3	4.0	3.9	3.9	24	65	17	7.9	13	4.5	27
27	4.2	4.3	4.0	3.9	3.8	30	58	16	9.9	11	5.1	26
28	4.3	4.3	4.0	3.9	3.8	32	52	15	12	11	4.8	24
29	4.5	4.2	4.0	3.9	---	55	46	14	13	11	4.6	23
30	4.4	4.2	4.0	3.9	---	79	43	12	13	9.7	4.4	21
31	4.3	---	4.0	3.9	---	97	---	13	---	12	16	---
TOTAL	135.3	128.6	126.6	122.9	108.4	565.0	2598	686	443.0	485.1	230.4	438.9
MEAN	4.36	4.29	4.08	3.96	3.87	18.2	86.6	22.1	14.8	15.6	7.43	14.6
MAX	5.8	4.7	4.2	4.7	4.1	97	161	39	25	31	16	27
MIN	4.1	4.2	4.0	3.9	3.7	3.7	43	12	7.7	9.4	4.4	9.0

CAL YR 1976 TOTAL 10106.0 MEAN 27.6 MAX 246 MIN 4.0
WTR YR 1977 TOTAL 6068.2 MEAN 16.6 MAX 161 MIN 3.7

04058400 GOOSE LAKE OUTLET NEAR SANDS STATION, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1976 to September 1977.

INSTRUMENTATION.--Water-quality monitor since November 1976.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument. Intermittent ice cover during winter period. Water quality monitor installed Nov. 3.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES (Nov. 3 to Sept. 30): Maximum, 25.0°C July 19; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1				---	---	---	1.0	0.5	0.5			
2				---	---	---	0.5	0.5	0.5			
3				5.0	3.5	---	1.0	0.5	0.5			
4				4.0	3.0	3.5	1.5	0.5	1.0			
5				4.5	3.5	4.0	1.5	1.0	1.5			
6				4.0	3.0	3.5	2.0	0.5	1.0			
7				3.0	2.0	2.5	1.0	0.5	0.5			
8				3.0	2.0	2.0	0.5	0.0	0.5			
9				3.5	2.0	2.5	1.5	0.5	0.5			
10				3.5	2.0	2.5	1.5	0.5	1.0			
11				2.5	2.0	2.0	1.5	0.5	1.0			
12				3.5	2.0	2.5	1.5	0.5	1.0			
13				3.5	2.0	2.5	0.5	0.0	0.5			
14				3.0	1.5	2.0	2.0	0.5	1.5			
15				3.0	1.5	2.0	2.0	1.5	2.0			
16				3.5	2.0	2.5	2.0	1.5	2.0			
17				3.5	2.0	2.5	2.0	2.0	2.0			
18				3.5	2.5	2.5	2.0	1.5	2.0			
19				3.0	2.5	2.5	2.0	1.5	2.0			
20				3.0	2.5	2.5	1.5	0.5	1.0			
21				2.5	2.0	2.0	1.5	0.5	1.0			
22				2.0	1.5	2.0	1.5	0.5	1.0			
23				2.0	1.5	2.0	1.0	0.5	0.5			
24				2.0	1.5	2.0	1.0	0.5	1.0			
25				2.0	1.5	2.0	1.5	1.0	1.0			
26				2.5	2.0	2.0	1.0	0.5	1.0			
27				2.5	1.0	2.0	---	---	---			
28				1.5	0.5	1.0	---	---	---			
29				1.5	0.5	0.5	---	---	---			
30				1.0	0.5	0.5	---	---	---			
31				---	---	---	---	---	---			
MONTH				5.0	0.5	2.0	2.0	0.0	1.0			

04058400 GOOSE LAKE OUTLET NEAR SANDS STATION, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	2.5	0.0	1.0	0.5	0.0	0.0	13.5	11.0	12.5
2	---	---	---	3.0	1.0	1.5	0.5	0.0	0.0	12.5	9.0	11.0
3	---	---	---	2.0	1.0	1.5	2.0	0.0	1.0	12.5	8.5	10.5
4	---	---	---	2.0	0.5	1.5	1.5	0.0	0.5	12.0	9.5	11.0
5	---	---	---	2.0	1.0	1.5	0.0	0.0	0.0	13.5	11.0	12.0
6	---	---	---	3.5	1.5	2.5	0.5	0.0	0.0	12.0	9.5	11.0
7	---	---	---	4.0	1.0	2.0	0.5	0.0	0.0	12.5	8.0	10.0
8	---	---	---	4.5	1.5	2.5	1.0	0.0	0.5	12.5	9.0	10.5
9	---	---	---	5.5	2.0	3.0	2.0	0.0	1.0	12.0	7.0	9.5
10	---	---	---	---	2.0	---	6.5	2.0	4.0	12.5	7.5	10.0
11	---	---	---	---	---	---	8.0	5.0	6.5	15.5	9.0	12.0
12	---	---	---	---	---	---	7.5	3.5	6.0	17.5	12.0	15.0
13	---	---	---	---	---	---	7.0	4.0	5.5	18.5	14.0	16.0
14	---	---	---	---	---	---	7.0	2.0	4.5	18.5	13.5	16.0
15	---	---	---	---	---	---	7.0	5.0	6.0	18.5	14.5	16.5
16	1.0	0.0	0.5	---	---	---	10.0	6.0	8.0	19.5	15.5	17.5
17	1.5	0.0	0.5	4.5	2.5	3.0	9.5	7.0	8.0	20.5	16.0	18.0
18	1.5	1.0	1.5	5.0	2.0	3.0	9.0	7.0	8.0	21.5	17.0	19.0
19	1.5	0.5	1.0	2.0	0.0	1.0	11.5	8.5	10.0	20.0	16.0	18.0
20	1.5	0.0	0.5	2.5	0.0	1.0	11.5	9.5	11.0	19.0	16.0	17.5
21	1.5	0.0	0.5	1.5	0.0	0.5	11.0	7.0	9.0	18.5	16.5	17.0
22	1.5	0.5	1.5	1.0	0.0	0.5	10.5	5.5	8.0	20.5	16.0	18.0
23	1.0	0.0	0.5	2.0	0.0	0.5	10.0	7.0	8.5	20.5	17.0	18.5
24	1.5	1.0	1.5	0.5	0.0	0.0	9.5	6.5	7.5	20.0	15.5	17.5
25	1.5	1.0	1.5	1.5	0.0	0.5	10.0	5.5	7.5	20.5	15.5	17.5
26	2.0	0.5	1.5	2.5	0.0	1.0	11.0	7.0	9.0	20.5	15.0	17.5
27	2.0	0.5	1.5	1.5	1.0	1.0	11.0	8.0	9.5	21.0	15.5	18.0
28	2.0	0.5	1.0	1.5	0.5	1.0	9.0	5.5	7.5	20.5	16.0	18.5
29	---	---	---	1.5	0.0	0.5	10.5	6.5	8.5	18.0	14.5	16.5
30	---	---	---	1.5	0.0	0.5	14.0	10.0	12.0	17.5	14.0	16.0
31	---	---	---	1.5	0.0	0.5	---	---	---	17.0	14.0	15.0
MONTH	2.0	0.0	1.0	5.5	0.0	1.5	14.0	0.0	5.5	21.5	7.0	15.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	14.0	12.0	13.0	15.5	14.0	14.5	16.0	14.0	14.5	15.0	14.5	14.5
2	15.5	10.5	12.5	17.0	12.0	14.5	15.5	12.5	14.0	14.5	13.5	14.0
3	17.0	11.5	14.0	17.0	14.0	15.5	14.5	12.5	13.5	13.5	12.0	13.0
4	19.5	15.5	17.0	17.5	15.5	16.5	14.5	12.5	13.5	13.5	12.5	13.0
5	17.0	15.0	16.0	21.0	16.5	18.5	15.5	13.5	14.5	13.5	13.0	13.0
6	16.5	13.0	14.5	21.0	18.5	20.0	15.0	12.5	14.0	13.0	12.5	12.5
7	15.5	12.0	14.0	21.0	18.0	19.5	16.0	14.0	15.0	13.0	12.0	12.5
8	16.0	12.5	14.0	21.0	17.5	19.5	16.0	14.5	15.0	13.5	12.5	13.0
9	16.0	11.0	13.5	19.0	15.5	17.5	14.0	13.0	13.5	14.0	13.5	14.0
10	15.0	11.0	13.0	17.5	13.5	16.0	14.5	13.0	13.5	13.5	12.5	13.0
11	14.0	12.5	13.0	18.5	15.5	17.0	14.0	12.5	13.5	12.5	11.5	12.0
12	14.5	12.0	13.0	18.5	16.5	18.0	13.5	11.5	12.5	12.0	11.5	12.0
13	15.5	10.5	13.0	19.0	16.0	17.5	14.0	12.5	13.0	12.0	11.5	11.5
14	16.0	11.5	14.0	21.0	16.5	18.5	13.0	11.5	12.5	11.5	10.5	11.0
15	17.0	13.0	15.0	22.5	18.5	20.0	13.0	11.0	12.0	11.5	10.5	11.0
16	16.0	14.0	14.5	21.0	17.5	19.5	12.5	11.5	12.0	11.5	11.0	11.5
17	17.0	13.0	15.0	22.5	19.5	21.0	12.5	11.0	11.5	12.0	11.5	11.5
18	17.0	15.0	16.0	22.5	19.0	20.5	12.5	10.5	11.5	12.5	12.0	12.0
19	16.5	14.0	15.5	25.0	20.5	22.5	13.0	11.0	12.0	12.5	11.5	12.0
20	17.0	14.0	15.5	24.5	22.5	23.5	12.5	10.5	11.5	11.5	9.5	10.5
21	15.5	12.5	14.5	23.0	20.0	21.5	13.5	12.0	12.5	11.0	8.5	9.5
22	15.5	12.5	14.0	21.0	16.0	18.5	12.0	10.5	11.5	10.5	9.0	10.0
23	14.5	14.0	14.5	21.5	17.0	19.0	12.0	9.5	10.5	11.0	10.5	10.5
24	15.5	14.0	14.5	21.5	18.5	20.0	12.5	9.0	10.5	11.0	10.5	11.0
25	17.0	13.0	15.0	20.0	17.0	18.5	12.0	9.5	10.5	12.5	10.5	11.5
26	17.0	13.5	15.5	18.0	14.0	16.5	12.5	11.0	11.5	12.0	11.0	11.5
27	17.0	15.5	16.5	17.0	14.0	16.0	14.0	12.5	13.0	12.0	11.0	11.5
28	18.5	16.0	17.5	17.0	15.0	15.5	14.5	14.0	14.0	12.0	11.0	11.5
29	18.5	15.5	17.0	16.0	14.5	15.0	14.5	13.0	13.5	11.5	10.5	11.5
30	17.5	15.0	16.0	15.5	13.0	14.5	13.5	12.5	13.0	10.5	9.0	10.0
31	---	---	---	17.0	14.0	16.0	15.0	13.0	14.0	---	---	---
MONTH	19.5	10.5	14.5	25.0	12.0	18.0	16.0	9.0	13.0	15.0	8.5	12.0

04058500 EAST BRANCH ESCANABA RIVER AT GWINN, MI

LOCATION.--Lat 46°17'10", long 87°26'00", in NE¼ sec.21, T.45 N., R.25 W., Marquette County, Hydrologic Unit 04030110, on right bank in county park at Gwinn, 1.1 mi (1.8 km) upstream from mouth.

DRAINAGE AREA.--124 mi² (321 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1954 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,079.2 ft (328.94 m) above mean sea level.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Since August 1962, some regulation by Schweitzer Reservoir (see station 04058190) about 16 mi (26 km) above station. An average of 3.0 ft³/s (0.085 m³/s) was diverted from headwaters of basin by the city of Ishpeming for municipal supply and the effluent discharged to the Carp River Basin. An average of 25 ft³/s (0.71 m³/s) was diverted from Schweitzer Reservoir by industry for iron ore processing and some returned to the Middle Branch Escanaba River via Green Creek. Diversion into Schweitzer Reservoir from Greenwood Reservoir via Greenwood Diversion (see station 04057813). Discharge during the year includes flow resulting from the dewatering of Gribben Lake Basin in the headwaters.

AVERAGE DISCHARGE.--23 years, 111 ft³/s (3.144 m³/s), 12.16 in/yr (309 mm/yr), adjusted for storage and diversion.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,390 ft³/s (67.7 m³/s) June 1, 1970, gage height, 14.97 ft (4.563 m); minimum, 19 ft³/s (0.54 m³/s) July 30, Oct. 11, 1963; minimum gage height, 6.46 ft (1.969 m) Sept. 14, 1976.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 595 ft³/s (16.9 m³/s) Apr. 13, gage height, 10.08 ft (3.072 m); minimum, 21 ft³/s (0.59 m³/s) Oct. 12, gage height, 6.52 ft (1.987 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	35	26	25	24	23	226	98	83	67	50	170
2	29	35	26	25	24	23	205	94	95	60	43	106
3	30	35	25	25	24	23	172	88	78	57	42	75
4	27	35	25	25	24	23	173	84	71	66	53	76
5	28	35	26	25	24	23	120	80	66	104	49	102
6	28	35	26	25	24	23	163	76	74	100	44	105
7	24	35	26	25	24	23	149	72	76	77	40	127
8	24	35	24	25	24	25	136	68	65	65	38	112
9	23	34	25	25	24	29	133	66	58	58	37	93
10	26	35	25	25	24	33	142	62	52	52	40	83
11	23	35	25	25	24	36	231	60	48	45	43	71
12	22	35	25	25	24	50	366	58	47	51	37	75
13	23	35	25	25	24	107	501	56	49	49	38	76
14	24	35	25	25	23	117	510	55	45	48	40	66
15	24	35	25	25	23	139	397	54	41	280	37	57
16	27	35	25	25	23	123	377	52	40	220	45	54
17	29	34	25	25	23	125	327	52	41	141	55	60
18	29	34	25	25	23	96	290	54	41	116	45	59
19	34	34	25	25	23	118	250	57	40	96	40	164
20	35	34	25	25	23	94	255	59	39	79	36	219
21	34	34	25	25	23	111	250	99	37	65	36	173
22	35	37	25	25	23	127	220	101	35	57	35	135
23	35	33	25	25	23	87	190	83	34	52	33	129
24	35	37	25	25	25	123	170	69	35	47	32	135
25	36	32	25	25	24	97	160	59	72	45	30	192
26	35	30	25	25	24	88	145	53	60	42	29	234
27	35	29	25	25	23	95	130	49	58	39	33	206
28	35	27	25	24	23	121	120	47	111	38	35	164
29	37	26	25	24	---	225	110	44	102	40	34	139
30	38	26	25	24	---	302	105	42	72	40	31	128
31	37	---	25	24	---	282	---	42	---	49	101	---
TOTAL	931	1006	779	771	661	2911	6723	2033	1765	2345	1281	3585
MEAN	30.0	33.5	25.1	24.9	23.6	93.9	224	65.6	58.8	75.6	41.3	120
MAX	38	37	26	25	25	302	510	101	111	280	101	234
MIN	22	26	24	24	23	23	105	42	34	38	29	54

CAL YR 1976 TOTAL 34384 MEAN 93.9 MAX 760 MIN 21 MEAN+ 107 CFSM+ 0.86 IN+ 11.75
WTR YR 1977 TOTAL 24791 MEAN 67.9 MAX 510 MIN 22 MEAN+ 87.3 CFSM+ 0.70 IN+ 9.56

+Adjusted for diversion and change in contents in Schweitzer Reservoir. Records of diversion furnished by Cleveland Cliffs Iron Co. and Michigan Department of Environmental Health.

04058500 EAST BRANCH ESCANABA RIVER AT GWINN, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1955 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (CA,MG) (MG/L)
OCT								
14...	1015	26	134	7.5	3.0	6.0	20	62
NOV								
24...	1330	36	168	7.4	-3.0	.0	45	73
DEC								
17...	1030	34	175	7.3	-2.5	.0	40	71
JAN								
20...	1210	25	155	7.5	-5.0	.0	27	71
FEB								
17...	1230	23	172	7.7	-3.5	.0	27	66
MAR								
15...	1000	E130	176	7.3	3.0	1.0	35	57
APR								
18...	1300	292	117	7.1	18.0	8.0	45	44
MAY								
18...	1445	54	198	7.9	26.5	21.0	10	86
JUN								
20...	0940	40	180	7.7	12.0	16.0	20	79
JUL								
12...	1100	56	161	8.1	24.5	19.5	100	71
AUG								
24...	0930	34	160	7.5	10.0	11.0	40	68

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL IRON (FE) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL MANGANESE (MN) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)
OCT							
14...	17	4.8	.01	510	360	20	10
NOV							
24...	20	5.7	.15	1400	1200	30	20
DEC							
17...	20	5.0	.14	1300	1000	30	20
JAN							
20...	20	5.0	.17	1100	620	30	20
FEB							
17...	18	5.0	.24	1100	850	20	10
MAR							
15...	14	5.4	1.2	1100	440	180	140
APR							
18...	12	3.5	.19	540	240	50	30
MAY							
18...	24	6.3	.05	630	360	60	50
JUN							
20...	22	5.8	.07	790	500	40	30
JUL							
12...	20	5.2	.10	1300	90	80	70
AUG							
24...	19	5.0	.01	700	430	30	20

04059000 ESCANABA RIVER AT CORNELL, MI

LOCATION.--Lat 45°54'31", long 87°12'49", in NW¼ sec.32, T.41 N., R.23 W., Delta County, Hydrologic Unit 04030110, on right bank 50 ft (15 m) downstream from bridge on County Road 519, 0.4 mi (0.6 km) downstream from Bobs Creek, 0.7 mi (1.1 km) northeast of Cornell, and 16 mi (26 km) upstream from mouth.

DRAINAGE AREA.--870 mi² (2,253 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1903 to December 1912, January 1913 to November 1915 (gage heights only), October 1950 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "near Escanaba" 1903-15.

REVISED RECORDS.--WSP 1387: 1904.

GAGE.--Water-stage recorder. Datum of gage is 749.26 ft (228.374 m) above mean sea level (levels by Michigan Department of Natural Resources). August 1903 to November 1915, nonrecording gage at site 10 mi (16 km) downstream at different datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Since 1950, diurnal fluctuation and occasional slight regulation caused by Boney Falls powerplant, 7 mi (11 km) upstream. Since August 1962, some regulation by Schweitzer Reservoir, about 50 mi (80 km) upstream (see station 04058190). Since December 1972, some regulation by Greenwood Reservoir about 60 mi (97 km) upstream (see station 04057811).

AVERAGE DISCHARGE.--36 years, (water years 1904-12, 1951-77), 884 ft³/s (25.03 m³/s), 13.80 in/yr (351 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,500 ft³/s (297 m³/s) May 7, 1960, gage height, 4.90 ft (1.494 m); maximum gage height, 6.40 ft (1.951 m) Apr. 9, 1971, backwater from ice; minimum discharge observed, 90 ft³/s (2.55 m³/s) July 5, 1910, gage height, 1.5 ft (0.46 m), site and datum then in use, but may have been less during extended periods of no gage-height record during winter periods of 1903-12, or periods of ice effect in 1959.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,900 ft³/s (110 m³/s) Apr. 14, gage height, 3.43 ft (1.045 m); maximum gage height, 5.52 ft (1.682 m) Mar. 30, backwater from ice; minimum discharge, 121 ft³/s (3.43 m³/s) Feb. 14, discharge measurement; minimum gage height, 1.23 ft (0.375 m) Nov. 16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	222	248	190	220	200	240	2370	915	354	337	337	882
2	236	256	220	220	200	240	1930	885	535	371	346	1110
3	205	244	200	220	200	250	1670	703	535	464	305	910
4	197	259	190	220	200	250	1610	598	474	283	298	759
5	211	264	250	220	200	230	978	600	389	426	354	698
6	207	270	210	220	200	220	1040	636	435	586	329	759
7	250	266	220	220	200	240	1280	601	389	504	305	925
8	247	257	230	220	200	260	1030	581	416	445	354	722
9	239	260	220	220	200	280	1050	536	371	380	227	674
10	202	276	230	220	200	300	1070	509	321	371	234	565
11	210	220	230	210	200	340	1560	483	329	329	275	545
12	196	190	220	210	200	400	2250	456	329	305	290	525
13	208	170	230	200	140	650	3290	398	313	337	268	651
14	206	150	230	200	160	1000	3800	427	329	354	261	617
15	220	160	240	200	180	1250	3680	483	305	607	290	525
16	238	175	280	200	180	1100	3560	351	290	1000	283	504
17	205	293	210	200	170	900	3230	419	283	710	389	565
18	202	268	230	200	160	950	2860	354	290	651	389	565
19	203	274	250	210	160	950	2620	371	290	772	346	710
20	268	250	230	210	160	940	2390	363	283	525	305	1440
21	244	190	270	210	170	820	2290	354	261	329	268	1530
22	276	150	280	210	180	780	2680	535	247	305	283	1320
23	264	160	260	210	180	750	2580	515	254	283	283	1260
24	218	160	240	170	190	700	2190	464	254	283	261	1460
25	206	170	230	160	200	600	1870	389	261	298	254	1760
26	200	220	230	160	210	550	1660	380	290	283	240	1960
27	199	210	220	170	220	750	1500	363	313	261	305	1940
28	212	170	220	180	230	900	1100	321	407	254	268	1590
29	244	170	220	180	---	1900	1060	313	445	254	268	1340
30	261	180	220	190	---	3000	985	305	407	283	268	1270
31	255	---	220	220	---	2750	---	298	---	283	313	---
TOTAL	6971	6530	7120	6300	5290	24490	61183	14906	10399	12873	9196	30081
MEAN	225	218	230	203	189	790	2039	481	347	415	297	1003
MAX	276	293	280	220	230	3000	3800	915	535	1000	389	1960
MIN	196	150	190	160	140	220	978	298	247	254	227	504
CFSM	.26	.25	.26	.23	.22	.91	2.34	.55	.40	.48	.34	1.15
IN.	.30	.28	.30	.27	.23	1.05	2.62	.64	.44	.55	.39	1.29

CAL YR 1976 TOTAL 280502 MEAN 766 MAX 5800 MIN 150 CFSM .88 IN 11.99
WTR YR 1977 TOTAL 195339 MEAN 535 MAX 3800 MIN 140 CFSM .62 IN 8.35

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1969-73, 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1975 to current year.
WATER TEMPERATURES: February 1975 to current year.

INSTRUMENTATION.--Water-quality monitor since October 1975.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument. Monthly samples are collected as a cross-section sample in the reach of stream from the County Road 519 bridge to a point 200 ft (61 m) downstream. Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 360 micromhos Sept. 10, 1975; minimum daily, 115 micromhos Apr. 24, 25, 1975.
WATER TEMPERATURES: Maximum daily, 35.0°C July 31, 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 30.0°C May 28, July 19, 20; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UM-MF (COL./100 ML)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)
OCT												
15...	1000	213	205	7.9	6.0	12.0	98	78	<1	13	93	0
NOV												
10...	1250	275	196	8.0	1.5	13.7	100	77	<1	82	90	0
DEC												
09...	1130	224	228	7.7	.0	12.6	88	25	--	82	100	0
JAN												
13...	1100	165	226	7.7	.0	11.4	79	44	<1	16	110	0
FEB												
14...	1100	121	227	7.7	.0	11.7	82	86	83	81	95	0
MAR												
23...	1400	765	194	7.3	.0	13.6	95	84	83	83	87	31
APR												
20...	1330	2400	126	7.6	11.0	10.6	96	137	84	84	61	15
MAY												
24...	1305	485	199	8.3	23.5	9.8	117	290	--	37	95	13
JUN												
17...	1015	298	196	8.0	18.5	10.0	109	340	82	B115	100	19
JUL												
06...	1055	616	194	8.0	22.0	9.3	109	2900	87	170	97	15
AUG												
03...	1030	313	198	7.8	18.0	9.9	107	290	B18	38	100	22
SEP												
07...	1145	1000	162	7.6	16.0	9.8	100	480	12	45	83	9

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
OCT												
15...	22	9.2	3.8	.2	1.1	120	0	98	2.4	7.7	2.9	.1
NOV												
10...	22	8.4	3.8	.2	1.0	114	0	94	1.8	9.5	3.5	.1
DEC												
09...	25	10	6.9	.3	1.2	136	0	112	4.3	10	4.9	.2
JAN												
13...	24	11	7.4	.3	1.2	158	0	130	5.0	9.3	4.3	.2
FEB												
14...	23	9.2	6.5	.3	1.2	130	0	107	4.2	9.8	4.3	.2
MAR												
23...	21	8.3	2.9	.1	1.6	68	0	56	5.5	28	4.4	.1
APR												
20...	14	6.2	1.4	.1	.8	56	0	46	2.3	22	2.9	.1
MAY												
24...	23	9.2	3.5	.2	1.2	100	0	82	.8	19	4.1	.1
JUN												
17...	24	10	2.9	.1	.9	100	0	82	1.6	17	4.4	.1
JUL												
06...	24	9.1	3.6	.2	1.0	100	0	82	1.6	12	3.4	.1
AUG												
03...	25	10	2.8	.1	.9	100	0	82	2.5	13	3.4	.0
SEP												
07...	20	8.1	2.3	.1	.7	90	0	74	3.6	16	3.1	.1

--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	SUS-PENDED SEDI-MENT (MG/L)	SUS-PENDED SEDI-MENT DIS-CHARGE (T/DAY)	SUS. SED. SIEVE DIAM. % FINER THAN .062 MM
OCT											
15...	7.8	115	114	66.1	.05	.20	.89	.02	2	1.2	100
NOV											
10...	8.1	123	113	91.3	.07	.22	.97	.03	1	.74	100
DEC											
09...	9.2	130	134	78.6	.16	.31	1.4	.02	0	.00	100
JAN											
13...	9.8	135	145	60.1	.22	.41	1.8	.02	2	.89	100
FEB											
14...	8.9	126	127	41.2	.22	1.7	7.6	.02	7	2.3	100
MAR											
23...	7.4	138	107	285	1.6	2.6	12	.08	3	6.2	100
APR											
20...	4.5	106	80	687	.22	.92	4.1	.08	9	58	100
MAY											
24...	4.9	125	114	164	.01	.55	2.4	.01	1	1.3	100
JUN											
17...	5.2	126	114	98.7	.05	.40	1.8	.01	2	1.6	100
JUL											
06...	6.6	120	109	213	.07	.61	2.7	.02	6	10	100
AUG											
03...	7.5	130	112	110	.04	.46	2.0	.01	3	2.5	100
SEP											
07...	8.2	135	103	365	.07	.72	3.2	.01	4	11	100

DATE	TIME	TOTAL ARSENIC (AS) (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	TOTAL CAD-MIUM (CD) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	TOTAL CHRO-MIUM (CR) (UG/L)	DIS-SOLVED CHRO-MIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	TOTAL IRON (FE) (UG/L)
OCT												
15...	1000	0	0	1	1	<10	<10	0	0	10	0	420
JAN												
13...	1100	1	0	--	4	<10	<10	0	0	0	0	580
APR												
20...	1330	0	0	2	2	<10	<10	0	0	0	0	310
JUL												
06...	1055	3	2	0	0	10	5	0	0	4	2	600

DATE	DIS-SOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	TOTAL MAN-GANESE (MN) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	TOTAL SELE-NIUM (SE) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	TOTAL ZINC (ZN) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	TOTAL ORGANIC CARBON (C) (MG/L)
OCT												
15...	260	--	9	30	20	<.5	<.5	0	0	--	10	5.8
JAN												
13...	290	9	--	10	0	<.5	<.5	0	0	10	10	6.0
APR												
20...	150	10	8	20	10	<.5	<.5	0	0	10	10	10
JUL												
06...	210	5	3	110	30	.0	.0	0	0	10	10	6.3

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

PERIPHYTON

DATE	LENGTH OF EXPO-SURE (DAYS)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)	CHLOR-A PERI-PHYTON CHRONO-GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI-PHYTON CHRONO-GRAPHIC FLUOROM (MG/M2)
NOV				
10...	26	1573	--	--
MAY				
24...	35	--	--	--
AUG				
03...	27	4033	1.20	1.25

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	OCT 15,76		NOV 18,76		DEC 9,76		JAN 13,77		FEB 14,77	
TIME	1000		1250		1130		1100		1100	
TOTAL CELLS/ML	320		630		110		160		57	
DIVERSITY: DIVISION	0.9		0.8		0.8		1.4		0.0	
.CLASS	0.9		0.8		0.8		1.4		0.0	
..ORDER	0.9		0.8		0.8		1.4		0.0	
...FAMILY	2.6		1.0		1.6		2.7		2.0	
....GENUS	2.6		1.0		1.6		2.7		2.4	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	3	2	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....SCENEDESMUS	72#	22	19	3	23#	20	23	15	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	10	2	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	--	-	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	--	-	--	-	--	-
....SPONDYLOSIUM	--	-	--	-	--	-	--	-	--	-
...ZYGNEMATACEAE										
....SPIROGYRA	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	--	-	--	-	--	-	--	-	--	-
....MELOSIRA	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	110#	33	--	-	3	2	4	2	--	-
....COCCONEIS	--	-	--	-	--	-	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	--	-
....CYMBELLA	9	3	--	-	--	-	*	0	4	7
...DIATOMACEAE										
....DIATOMA	9	3	19	3	73#	65	--	-	19#	33
...FRAGILARIACEAE										
....FRAGILARIA	--	-	--	-	--	-	--	-	19#	33
....SYNEDRA	27	8	19	3	6	5	27#	17	4	7
...GOMPHONEMATACEAE										
....GOMPHONEMA	45	14	10	2	3	2	12	7	--	-
...NAVICULACEAE										
....NAVICULA	9	3	--	-	--	-	23	15	4	7
....PINNULARIA	--	-	--	-	--	-	--	-	4	7
...NITZSCHIACEAE										
....HANTZSCHIA	--	-	19	3	--	-	--	-	--	-
....NITZSCHIA	36	11	--	-	3	2	38#	24	4	7
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE / TIME	OCT 15,76 1000		NOV 10,76 1250		DEC 9,76 1130		JAN 13,77 1100		FEB 14,77 1100	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCOCCALES										
...CHROCOCCACEAE										
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....LYNGBYA	--	-	530#	85	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-	27#	17	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	4	2	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....TRACHELOMONAS	9	3	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	--	-	--	-	--	-

DATE / TIME	MAY 24,77 1305		JUN 17,77 1015		JUL 6,77 1055		AUG 3,77 1030		SEP 7,77 1145	
TOTAL CELLS/ML	2600		5300		460		1100		250	
DIVERSITY: DIVISION	1.4		1.2		1.3		1.0		1.0	
.CLASS	1.4		1.2		1.4		1.0		1.0	
..ORDER	1.6		1.8		1.6		1.4		1.5	
...FAMILY	3.2		3.3		2.8		2.8		2.1	
....GENUS	3.4		3.6		2.9		3.1		2.1	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...COELASTRACEAE										
....COELASTRUM	--	-	120	2	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	810#	15	24	5	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	27	1	--	-	--	-	--	-	--	-
....MICRACTINIUM	27	1	87	2	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	27	1	120	2	21	4	36	3	--	-
....DICTYOSPHAERIUM	230	9	58	1	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	29	1	--	-	--	-	--	-
....OOCYSTIS	--	-	620	12	--	-	36	3	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	14	1	43	1	--	-	--	-	--	-
...SCENEDESMACEAE										
....SCENEDESMUS	110	4	1300#	25	200#	43	230#	20	110#	45
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	--	-	--	-	55	5	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	--	-	--	-	--	-	27	2	--	-
....COSMARIUM	--	-	*	0	14	3	46	4	--	-
....SPONDYLOSIUM	--	-	--	-	--	-	--	-	11	5
...ZYGNEMATACEAE										
....SPIROGYRA	--	-	300	6	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
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04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAY 24,77 1305		JUN 17,77 1015		JUL 6,77 1055		AUG 3,77 1030		SEP 7,77 1145	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	68	3	130	2	--	-	--	-	17	7
....MELOSIRA	27	1	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	480#	18	270	5	--	-	310#	28	11	5
....COCCONEIS	14	1	*	0	--	-	9	1	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	9	1	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	36	3	--	-
....CYMBELLA	180	7	160	3	48	10	36	3	--	-
...DIATOMACEAE										
....DIATOMA	120	5	--	-	--	-	9	1	--	-
...FRAGILARIACEAE										
....FRAGILARIA	--	-	--	-	14	3	--	-	--	-
....SYNEDRA	--	-	29	1	24	5	46	4	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	41	2	--	-	41	9	18	2	--	-
...NAVICULACEAE										
....NAVICULA	290	11	270	5	14	3	200#	18	62#	25
....PINNULARIA	27	1	--	-	--	-	9	1	--	-
...NITZSCHIACEAE										
....HANTZSCHIA	--	-	--	-	--	-	--	-	--	-
....NITZSCHIA	410#	16	230	4	17	4	--	-	34	14
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	10	2	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCOCCALES										
...CHROCOCCACEAE										
....AGMENELLUM	--	-	230	4	--	-	--	-	--	-
....ANACYSTIS	--	-	120	2	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	35	7	--	-	--	-
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	480#	18	260	5	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	55	2	--	-	--	-	--	-	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	*	0	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	202	197	199	204	195	199	239	230	---	240	230	233
2	200	193	196	201	198	199	234	229	---	233	230	231
3	196	191	194	199	196	197	238	229	231	231	230	231
4	197	189	193	199	189	194	250	229	---	239	230	231
5	198	190	193	198	196	197	252	234	---	242	230	---
6	200	194	197	197	194	195	242	232	---	230	229	230
7	201	193	198	205	195	---	252	237	---	246	237	---
8	196	187	190	212	199	---	253	236	---	242	238	---
9	194	188	190	210	193	201	254	238	---	246	239	---
10	195	189	192	210	197	201	269	235	---	247	237	---
11	196	189	192	214	200	207	258	234	---	252	237	---
12	201	196	199	212	193	204	251	234	---	253	238	---
13	204	198	201	218	194	209	254	234	245	256	237	---
14	208	201	204	230	201	218	254	232	240	253	235	---
15	205	198	200	238	208	221	254	232	238	254	240	---
16	201	196	198	248	211	---	250	230	---	264	241	---
17	199	195	197	229	210	---	249	230	---	273	237	---
18	207	193	197	---	---	---	251	235	---	263	228	---
19	197	193	195	238	218	---	254	232	---	258	226	---
20	204	196	198	225	212	218	246	232	---	249	227	---
21	207	205	206	227	214	218	241	232	236	252	239	---
22	205	195	198	230	213	---	247	237	---	244	236	---
23	196	192	194	232	216	---	249	233	---	240	223	---
24	197	190	193	231	221	---	257	235	---	---	---	---
25	192	188	190	236	210	---	244	231	---	244	210	---
26	198	191	194	243	208	---	244	231	---	227	219	224
27	205	198	200	224	214	---	246	230	---	228	223	226
28	208	203	206	240	226	---	243	230	---	226	223	224
29	208	205	206	235	229	---	249	241	---	224	223	224
30	205	199	201	238	228	---	244	241	---	226	221	223
31	201	196	197	---	---	---	243	240	242	240	219	223
MONTH	208	187	197	248	189	205	269	229	239	273	210	227

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	238	211	220				---	---	---	198	190	---
2	240	211	221				---	---	---	201	191	195
3	241	207	213				---	---	---	217	195	---
4	247	219	---				---	---	---	224	201	207
5	251	218	---				---	---	---	226	208	---
6	230	219	---				---	---	---	221	209	212
7	226	219	---				---	---	---	216	209	212
8	229	213	---				---	---	---	214	209	211
9	233	207	---				---	---	---	215	211	214
10	219	206	---				---	---	---	216	212	---
11	228	203	---				---	---	---	228	213	---
12	243	201	214				---	---	---	228	216	221
13	238	201	---				---	---	---	235	223	---
14	212	202	209				---	---	---	233	223	228
15	233	210	217				---	---	---	244	208	226
16	235	215	---				---	---	---	242	234	---
17	233	210	---				---	---	---	253	223	---
18	224	209	213				---	---	---	267	237	---
19	247	218	226				---	---	---	268	232	244
20	261	223	---				176	173	175	260	235	244
21	254	226	234				189	174	---	247	236	240
22	251	220	---				173	169	---	235	221	227
23	247	224	234				180	166	169	241	222	231
24	237	221	---				187	169	---	247	221	233
25	243	213	---				188	170	173	239	222	231
26	240	213	---				194	172	---	236	223	229
27	239	221	---				193	176	179	238	225	230
28	242	226	---				188	177	---	233	226	231
29	---	---	---				187	182	186	235	219	227
30	---	---	---				195	184	189	230	222	227
31	---	---	---				---	---	---	255	228	238
MONTH	261	201	220				195	166	179	268	190	225

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	283	251	263	297	278	285	255	232	244	---	---	---
2	288	240	248	284	277	280	250	232	242	---	---	---
3	259	238	244	286	262	271	246	208	220	---	---	---
4	282	245	---	315	290	298	236	211	224	---	---	---
5	293	251	263	351	317	331	227	213	220	---	---	---
6	293	238	259	344	309	320	226	216	222	---	---	---
7	282	237	249	317	311	315	226	218	222	---	---	---
8	245	237	241	317	306	311	233	214	223	---	---	---
9	242	237	240	309	300	304	234	224	229	---	---	---
10	244	237	241	298	288	293	233	224	229	---	---	---
11	247	238	243	295	281	289	232	218	225	---	---	---
12	250	243	245	286	275	280	223	216	220	---	---	---
13	251	241	245	281	266	273	225	217	221	212	204	208
14	246	238	243	272	258	265	225	216	220	214	208	211
15	250	238	243	284	265	278	223	211	216	---	---	---
16	245	235	241	272	255	262	234	220	228	---	---	---
17	251	237	244	268	254	260	228	218	222	---	---	---
18	261	243	252	259	246	252	229	219	224	---	---	---
19	260	249	254	252	240	246	230	223	227	---	---	---
20	255	245	250	259	241	250	229	216	223	---	---	---
21	255	244	248	266	254	259	231	219	225	---	---	---
22	258	245	250	261	249	253	225	216	219	---	---	---
23	259	245	252	266	249	256	219	214	217	---	---	---
24	265	245	257	263	248	257	---	---	---	---	---	---
25	280	265	276	293	255	275	---	---	---	---	---	---
26	280	274	277	285	252	267	---	---	---	---	---	---
27	303	281	291	284	268	275	---	---	---	---	---	---
28	305	294	298	269	262	265	---	---	---	---	---	---
29	302	295	298	287	267	276	---	---	---	---	---	---
30	297	282	289	277	264	271	---	---	---	223	220	221
31	---	---	---	286	261	274	---	---	---	---	---	---
MONTH	305	235	257	351	240	277	255	208	224	223	204	213

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	19.5	8.0	13.0	6.0	.0	2.5	2.0	.0	1.0	.0	.0	.0
2	18.5	9.5	13.5	8.5	3.5	5.5	.0	.0	.0	.0	.0	.0
3	19.0	8.0	13.0	4.5	.5	2.0	.0	.0	.0	.0	.0	.0
4	18.0	11.0	14.5	2.0	.0	1.0	.0	.0	.0	.0	.0	.0
5	14.0	11.0	12.5	4.0	1.0	2.0	.0	.0	.0	.0	.0	.0
6	11.0	7.0	9.5	2.0	.0	1.0	1.0	.0	.5	.0	.0	.0
7	10.5	8.0	9.0	1.0	.0	.5	1.0	.0	.5	.0	.0	.0
8	12.5	6.0	9.0	1.0	.0	.5	.0	.0	.0	.0	.0	.0
9	13.5	6.0	9.5	1.0	.0	.5	1.0	.0	.5	.0	.0	.0
10	12.5	8.0	10.0	2.0	.0	1.0	.5	.5	.5	.0	.0	.0
11	13.5	5.0	9.0	.0	.0	.0	1.5	.5	.5	.0	.0	.0
12	15.0	8.5	11.5	.0	.0	.0	1.0	.5	.5	.0	.0	.0
13	13.0	7.5	10.0	.0	.0	.0	.5	.5	.5	.0	.0	.0
14	9.5	4.5	7.0	.0	.0	.0	.5	.5	.5	.0	.0	.0
15	10.0	6.0	7.5	.0	.0	.0	.5	.5	.5	.0	.0	.0
16	9.0	5.0	6.0	4.0	.0	1.5	1.5	.5	.5	.0	.0	.0
17	9.0	4.0	6.0	.0	.0	.0	4.5	.5	1.5	.0	.0	.0
18	6.0	1.5	4.0	.0	.0	.0	1.5	.5	.5	.0	.0	.0
19	5.5	3.0	4.0	3.0	.0	1.0	1.5	.5	.5	.0	.0	.0
20	8.0	1.0	4.0	.0	.0	.0	2.5	.5	1.5	.0	.0	.0
21	7.0	3.0	4.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
22	6.5	1.0	3.5	4.5	.0	1.5	.0	.0	.0	.0	.0	.0
23	6.5	.0	3.0	4.5	.0	2.0	.0	.0	.0	.0	.0	.0
24	6.5	1.0	3.5	4.0	.0	1.5	.0	.0	.0	.0	.0	.0
25	4.5	2.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
26	5.0	.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
27	5.5	.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	7.0	.0	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	8.5	1.5	4.0	2.0	.0	1.0	.0	.0	.0	.0	.0	.0
30	5.5	1.5	3.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
31	7.0	.0	3.0	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	19.5	.0	7.0	8.5	.0	1.0	4.5	.0	.5	.0	.0	.0

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.5	9.0	10.5
2	.0	.0	.0	.0	.0	.0	.0	.0	.0	14.0	7.5	10.5
3	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.0	6.5	9.5
4	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.0	8.0	10.0
5	.0	.0	.0	.0	.0	.0	.0	.0	.0	14.5	9.5	11.0
6	.0	.0	.0	.0	.0	.0	.0	.0	.0	14.5	8.5	11.0
7	.0	.0	.0	.0	.0	.0	.0	.0	.0	14.5	6.0	10.0
8	.0	.0	.0	.0	.0	.0	.0	.0	.0	13.5	7.0	9.5
9	.0	.0	.0	.0	.0	.0	.0	.0	.0	15.0	6.0	10.0
10	.0	.0	.0	.0	.0	.0	.0	.0	.0	15.5	6.0	10.5
11	.0	.0	.0	.0	.0	.0	---	---	---	18.0	8.0	13.0
12	.0	.0	.0	.0	.0	.0	---	---	---	20.0	11.0	14.5
13	.0	.0	.0	.0	.0	.0	---	---	---	22.0	13.0	16.0
14	.0	.0	.0	.0	.0	.0	---	---	---	21.5	12.5	16.5
15	.0	.0	.0	.0	.0	.0	---	---	---	20.5	12.5	16.5
16	.0	.0	.0	.0	.0	.0	---	---	---	24.0	12.5	18.5
17	.0	.0	.0	.0	.0	.0	---	---	---	24.5	16.0	20.0
18	.0	.0	.0	.0	.0	.0	---	---	---	26.0	18.0	21.5
19	.0	.0	.0	.0	.0	.0	---	---	---	26.0	17.5	21.0
20	.0	.0	.0	.0	.0	.0	10.0	---	---	27.0	18.0	22.0
21	.0	.0	.0	.0	.0	.0	9.5	8.0	8.5	24.5	18.5	21.5
22	.0	.0	.0	.0	.0	.0	9.0	6.5	7.5	24.5	18.5	21.0
23	.0	.0	.0	.0	.0	.0	8.5	6.0	7.5	25.0	18.0	21.0
24	.0	.0	.0	.0	.0	.0	8.0	6.0	7.0	27.5	18.0	22.0
25	.0	.0	.0	.0	.0	.0	9.0	5.5	7.0	26.5	17.5	22.0
26	.0	.0	.0	.0	.0	.0	9.5	5.5	7.5	27.0	17.0	21.5
27	.0	.0	.0	.0	.0	.0	11.0	6.5	8.5	28.5	16.5	22.0
28	.0	.0	.0	.0	.0	.0	10.0	6.0	7.5	30.0	17.0	22.5
29	---	---	---	.0	.0	.0	11.0	4.5	7.5	25.0	16.5	20.5
30	---	---	---	.0	.0	.0	13.0	8.0	10.0	25.0	16.0	20.0
31	---	---	---	.0	.0	.0	---	---	---	20.0	16.0	18.0
MONTH	.0	.0	.0	.0	.0	.0	13.0	.0	4.0	30.0	6.0	16.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	17.0	13.0	15.5	18.5	15.5	17.0	24.0	16.5	20.0	---	---	---
2	20.5	12.5	16.0	25.5	14.0	19.5	27.0	17.0	21.0	---	---	---
3	22.0	11.5	16.5	22.0	16.0	18.5	23.5	15.5	19.0	---	---	---
4	24.0	15.0	18.5	27.5	17.0	21.5	21.5	16.5	19.0	---	---	---
5	20.0	15.0	17.0	25.0	17.0	21.5	25.0	18.0	21.0	---	---	---
6	21.0	14.0	17.0	26.5	19.0	22.0	26.0	16.0	20.5	---	---	---
7	21.5	11.5	16.5	25.0	19.5	21.5	28.0	17.5	22.0	---	---	---
8	21.5	13.5	17.0	27.0	19.0	22.5	26.5	18.0	21.5	---	---	---
9	23.5	11.0	16.5	24.5	16.5	20.5	23.5	15.0	19.5	---	---	---
10	19.0	11.5	15.5	25.5	14.5	20.0	24.5	17.5	20.5	---	---	---
11	18.0	13.5	15.5	25.0	17.5	21.0	24.5	16.0	20.0	---	---	---
12	21.5	13.0	16.5	27.5	19.5	23.0	26.5	14.0	20.0	---	---	---
13	23.0	11.5	17.0	29.0	18.5	22.5	25.5	17.0	20.0	17.0	11.5	---
14	24.0	12.5	18.5	27.0	18.5	22.5	25.0	14.0	19.0	17.5	11.0	---
15	26.0	14.0	19.5	29.0	20.5	24.0	23.0	14.0	18.5	---	---	---
16	20.0	15.0	18.0	26.0	21.0	23.5	18.5	16.0	17.0	---	---	---
17	26.0	16.0	21.0	28.0	22.0	24.0	21.5	13.5	17.0	---	---	---
18	24.0	17.5	20.5	26.0	21.0	23.0	22.0	12.5	17.0	---	---	---
19	24.0	16.5	20.0	30.0	22.0	25.0	23.0	13.0	17.0	---	---	---
20	24.5	17.5	20.5	30.0	23.0	26.0	21.5	12.5	16.5	---	---	---
21	27.5	15.0	21.0	29.0	19.5	24.0	22.0	14.5	17.5	---	---	---
22	27.5	15.5	21.0	29.0	17.0	22.5	20.5	12.0	16.0	---	---	---
23	22.5	17.0	19.5	28.5	18.0	23.5	---	11.5	---	---	---	---
24	27.5	19.0	22.0	28.5	21.0	23.5	---	---	---	---	---	---
25	28.5	17.0	22.5	26.0	17.5	21.5	---	---	---	---	---	---
26	28.5	16.5	22.5	26.5	16.0	21.5	---	---	---	---	---	---
27	23.0	19.0	21.0	27.0	16.5	21.5	---	---	---	---	---	---
28	27.0	19.5	22.0	21.0	18.0	19.5	---	---	---	---	---	---
29	25.5	18.0	21.0	27.5	19.0	22.0	---	---	---	---	---	---
30	20.0	18.0	19.0	25.5	17.5	21.0	---	---	---	12.5	11.0	12.0
31	---	---	---	26.5	18.0	21.5	---	---	---	---	---	---
MONTH	28.5	11.0	19.0	30.0	14.0	22.0	28.0	11.5	19.0	17.5	11.0	12.0

04059400 TENMILE CREEK AT PERRONVILLE, MI

LOCATION.--Lat 45°48'38", long 87°22'00", in NE¼ NE¼ sec.3, T.39 N., R.25 W., Menominee County, Hydrologic Unit 04030109, on left bank 10 ft (3 m) downstream from bridge on county road, 700 ft (213 m) upstream from County Road 569, and 1.0 mi (1.6 km) northwest of Perronville.

DRAINAGE AREA.--38.4 mi² (99.5 km²).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1969, 1970. April 1971 to September 1977 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 810 ft (247 m) from topographic map (nearest 10 ft). Prior to Sept. 29, 1971, non-recording gage at present site and datum.

REMARKS.--Records fair except those below 2.0 ft³/s (0.057 m³/s), which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--6 years, 41.4 ft³/s (1.172 m³/s), 14.64 in/yr (372 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 810 ft³/s (22.9 m³/s) Apr. 24, 1975, gage height, 5.42 ft (1.652 m); maximum gage height, 8.94 ft (2.725 m) Mar. 30, 1977, backwater from ice; no flow Jan. 11-16, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 243 ft³/s (6.88 m³/s) Apr. 16, gage height, 3.75 ft (1.143 m); maximum gage height, 8.94 ft (2.725 m) Mar. 30, backwater from ice; no flow Jan. 11-16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.86	1.0	.54	.01	.03	.19	200	58	27	31	12	33
2	.86	1.0	.45	.01	.03	.20	183	56	40	24	29	28
3	.77	1.0	.35	.01	.03	.21	150	51	36	20	26	23
4	.68	1.0	.25	.01	.04	.23	111	44	34	25	44	19
5	1.1	1.0	.20	.01	.04	.24	136	42	36	30	40	18
6	1.1	1.0	.16	.01	.04	.25	132	45	31	36	27	19
7	1.1	1.0	.13	.01	.04	.26	107	40	26	31	19	29
8	1.0	1.0	.10	.01	.04	.27	96	35	23	31	14	29
9	.95	1.0	.09	.01	.05	.28	78	31	19	26	10	25
10	.86	1.0	.08	.01	.05	.32	96	28	15	19	8.7	20
11	.77	1.0	.07	.00	.06	.60	148	26	14	14	8.2	16
12	.77	1.0	.07	.00	.06	1.8	170	24	13	12	6.1	22
13	.74	1.0	.06	.00	.06	5.0	201	22	11	9.1	5.6	28
14	.77	.94	.06	.00	.07	13	221	21	9.3	6.9	6.3	28
15	.86	.78	.05	.00	.07	23	229	20	7.5	12	5.3	24
16	.86	.78	.05	.00	.07	29	238	19	6.3	13	8.4	29
17	.86	.78	.04	.01	.08	32	236	18	5.6	10	13	49
18	.86	.78	.04	.01	.08	32	218	17	7.9	11	12	44
19	.86	.86	.03	.01	.09	27	199	13	10	12	7.3	103
20	.86	.86	.03	.01	.09	23	177	12	9.0	10	4.6	124
21	.95	.86	.03	.01	.10	20	177	11	6.5	7.4	4.2	104
22	.95	.86	.03	.01	.11	18	199	11	4.8	4.9	3.8	88
23	.95	.86	.02	.01	.12	16	185	11	3.6	3.4	3.7	91
24	.95	.78	.02	.01	.13	14	147	8.7	3.3	4.8	3.1	125
25	.95	.78	.02	.01	.13	13	141	7.2	18	5.7	2.7	205
26	.95	.76	.02	.02	.14	12	121	6.3	20	3.8	4.3	179
27	1.0	.74	.02	.02	.16	13	103	5.2	25	2.7	8.1	151
28	1.0	.70	.02	.02	.18	40	87	4.3	62	3.5	9.7	128
29	1.0	.64	.02	.02	---	90	73	3.6	48	2.6	8.7	109
30	1.0	.60	.01	.02	---	150	62	3.1	32	2.2	6.0	93
31	1.0	---	.01	.03	---	180	---	3.6	---	8.5	14	---
TOTAL	28.19	26.36	3.07	.32	2.19	754.85	4621	697.0	603.8	432.5	374.8	1983
MEAN	.91	.88	.099	.010	.078	24.4	154	22.5	20.1	14.0	12.1	66.1
MAX	1.1	1.0	.54	.03	.18	180	238	58	62	36	44	205
MIN	.68	.60	.01	.00	.03	.19	62	3.1	3.3	2.2	2.7	16
CFSM	.02	.02	.003	.000	.002	.64	4.01	.59	.52	.37	.32	1.72
IN.	.03	.03	.00	.00	.00	.73	4.48	.68	.58	.42	.36	1.92

CAL YR 1976 TOTAL 11905.89 MEAN 32.5 MAX 308 MIN .01 CFSM .85 IN 11.53
WTR YR 1977 TOTAL 9527.08 MEAN 26.1 MAX 238 MIN .00 CFSM .68 IN 9.23

04059500 FORD RIVER NEAR HYDE, MI

LOCATION.--Lat 45°45'20", long 87°12'05", in SW¼ sec.19, T.39 N., R.23 W., Delta County, Hydrologic Unit 04030109, on right bank 40 ft (12 m) downstream from bridge on County Road 533, 1.4 mi (2.3 km) downstream from Tennile Creek, and 1.5 mi (2.4 km) north of Hyde.

DRAINAGE AREA.--450 mi² (1,166 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1954 to current year.

GAGE.--Water-stage recorder. Datum of gage is 677.9 ft (206.62 m) above mean sea level.

REMARKS.--Water-discharge records good except those for the winter period, which are fair.

AVERAGE DISCHARGE.--23 years, 371 ft³/s (10.51 m³/s), 11.20 in/yr (284 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,590 ft³/s (215 m³/s) May 7, 1960, gage height, 8.27 ft (2.521 m); minimum, 18 ft³/s (0.510 m³/s) Aug. 30, 1976, gage height, 1.33 ft (0.405 m).

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 2,390 ft³/s (67.7 m³/s) Apr. 17, gage height, 5.21 ft (1.588 m); maximum gage height, 5.50 ft (1.676 m) Mar. 13, backwater from ice; minimum daily discharge, 23 ft³/s (0.65 m³/s) Dec. 2, result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	46	24	26	30	32	1420	533	146	185	81	130
2	31	48	23	26	30	31	1410	491	201	163	110	287
3	30	47	24	27	30	31	1280	439	253	151	118	349
4	30	49	24	28	30	31	1180	392	271	158	135	388
5	35	52	25	28	29	31	787	374	263	222	138	377
6	35	47	26	28	29	31	765	375	246	339	121	351
7	33	52	27	27	28	32	775	352	221	375	107	351
8	34	52	28	26	29	32	704	327	209	360	96	350
9	37	50	27	25	30	34	707	299	185	315	83	325
10	38	49	26	24	31	36	754	269	164	263	73	285
11	39	48	26	24	33	45	923	246	151	216	67	240
12	38	46	26	24	35	60	1210	226	137	178	62	236
13	39	44	27	25	32	120	1510	210	122	144	66	259
14	39	43	27	25	30	180	1810	202	110	127	64	266
15	39	41	28	25	26	245	2070	194	100	190	60	261
16	39	40	30	25	26	350	2310	188	92	238	73	243
17	42	39	31	26	27	400	2390	179	89	210	78	281
18	42	38	31	26	27	400	2260	170	98	215	95	291
19	44	39	31	26	28	370	1970	159	97	213	115	466
20	44	40	31	26	28	330	1620	152	89	174	115	747
21	43	40	31	26	29	300	1520	142	80	140	98	769
22	44	39	31	27	29	230	1680	176	73	110	83	732
23	42	38	31	27	30	200	1580	242	67	91	74	741
24	44	38	30	28	30	180	1430	235	64	83	66	894
25	45	39	30	28	30	160	1280	203	89	76	63	1380
26	48	40	29	28	31	150	1110	171	117	65	71	1340
27	48	40	28	28	31	145	939	146	139	58	75	1200
28	44	35	27	28	32	350	787	128	218	54	73	1110
29	47	30	27	28	---	1000	670	112	221	54	72	1040
30	46	26	27	28	---	1300	591	100	192	51	72	929
31	48	---	26	29	---	1400	---	96	---	68	84	---
TOTAL	1237	1275	859	822	830	8236	39442	7528	4504	5286	2688	16618
MEAN	39.9	42.5	27.7	26.5	29.6	266	1315	243	150	171	86.7	554
MAX	48	52	31	29	35	1400	2390	533	271	375	138	1380
MIN	30	26	23	24	26	31	591	96	64	51	60	130
CFSM	.09	.09	.06	.06	.07	.59	2.92	.54	.33	.38	.19	1.23
IN.	.10	.11	.07	.07	.07	.68	3.26	.62	.37	.44	.22	1.37

CAL YR 1976 TOTAL 125720 MEAN 343 MAX 3040 MIN 19 CFSM .76 IN 10.39
WTR YR 1977 TOTAL 89325 MEAN 245 MAX 2390 MIN 23 CFSM .54 IN 7.38

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1956 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: December 1974 to current year.
WATER TEMPERATURES: July 1956 to current year.

INSTRUMENTATION.--Temperature recorder July 1956 to September 1975. Water-quality monitor since October 1975.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument. Monthly samples are collected as a cross-section sample in reach of stream 200 ft (61 m) upstream to 200 ft (61 m) downstream from gage.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 482 micromhos Dec. 2, 1976; minimum recorded, 131 micromhos May 22, 1976.
WATER TEMPERATURES: Maximum, 31.0°C July 31, 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 482 micromhos Dec. 2; minimum, 149 micromhos Apr. 3.
WATER TEMPERATURES: Maximum, 29.5°C July 20; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UM-MF (COL./100 ML)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)
OCT												
14...	1045	36	345	8.3	7.0	11.3	95	183	84	34	200	5
NOV												
10...	1030	48	389	8.1	.5	13.5	95	29	<1	87	210	0
DEC												
10...	1130	26	460	7.6	.0	7.3	51	31	81	<1	250	7
JAN												
13...	1410	25	434	7.6	.0	6.4	45	811	82	84	230	6
FEB												
15...	1115	26	391	7.5	.0	9.4	66	<1	<1	81	210	0
MAR												
15...	1100	244	276	7.9	.0	14.0	97	250	53	69	140	25
APR												
21...	1045	1510	200	7.8	10.0	10.3	93	250	86	10	110	31
MAY												
25...	1010	205	292	8.2	21.0	8.3	93	520	20	88	170	31
JUN												
15...	1045	100	313	8.2	19.0	8.9	97	210	15	41	180	31
JUL												
07...	1350	385	270	7.9	22.5	8.4	99	640	56	44	160	32
AUG												
02...	1030	94	311	7.9	19.0	8.7	95	240	56	200	180	20
SEP												
06...	1135	336	265	7.8	16.0	9.2	94	220	38	49	140	35

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
OCT												
14...	42	22	1.2	.0	1.0	232	0	190	1.9	13	2.5	.1
NOV												
10...	45	23	1.5	.0	1.0	260	0	213	3.3	15	2.8	.1
DEC												
10...	54	27	1.8	.1	1.0	292	0	240	12	17	2.8	.1
JAN												
13...	50	25	1.4	.0	.9	270	0	221	11	15	2.6	.1
FEB												
15...	46	23	1.6	.0	1.0	264	0	217	13	15	3.5	.1
MAR												
15...	33	14	1.1	.0	1.7	140	0	115	2.8	22	3.2	.1
APR												
21...	25	11	.9	.0	.6	94	0	77	2.4	29	2.5	.1
MAY												
25...	39	17	1.5	.1	.9	166	0	140	1.7	29	2.5	.0
JUN												
15...	41	19	1.5	.0	.7	182	0	150	1.8	29	2.5	.0
JUL												
07...	38	15	1.1	.0	.5	152	0	120	3.1	22	1.9	.0
AUG												
02...	41	19	1.4	.0	.8	196	0	160	3.9	12	2.7	.0
SEP												
06...	32	15	1.6	.1	.7	130	0	110	3.3	29	2.9	.1

B--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	SUS-PENDED SEDI-MENT (MG/L)	SUS-PENDED SEDI-MENT DIS-CHARGE (T/DAY)	SUS. SED. SIEVE DIAM. % FINER THAN .062 MM
OCT											
14...	7.2	199	203	19.3	.00	.18	.80	.06	2	.19	100
NOV											
10...	9.3	227	226	29.4	.01	.16	.71	.02	2	.26	100
DEC											
10...	11	254	259	17.8	.04	.12	.53	.01	2	.14	100
JAN											
13...	12	243	240	16.6	.12	.33	1.5	.02	2	.14	100
FEB											
15...	11	224	231	16.0	.17	--	--	.02	8	.57	100
MAR											
15...	5.6	173	150	114	1.2	1.9	8.4	.03	5	3.3	100
APR											
21...	3.9	157	119	640	.07	.87	3.9	.04	14	57	100
MAY											
25...	5.9	195	178	108	.06	.44	1.9	.01	2	1.1	100
JUN											
15...	5.4	218	189	58.9	.02	.67	3.0	.01	1	.27	100
JUL											
07...	6.7	202	160	210	.02	.73	3.2	.01	8	8.3	100
AUG											
02...	5.7	211	179	53.6	.01	.46	2.0	.01	2	.51	100
SEP											
06...	9.3	200	155	181	.02	.75	3.3	.01	9	8.2	100

DATE	TIME	TOTAL ARSENIC (AS) (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	TOTAL CAD-MIUM (CD) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	TOTAL CHRO-MIUM (CR) (UG/L)	DIS-SOLVED CHRO-MIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	TOTAL IRON (FE) (UG/L)
OCT												
14...	1045	0	0	1	0	<10	<10	1	1	0	0	80
JAN												
13...	1410	1	0	1	--	<10	<10	0	0	0	0	170
APR												
21...	1045	1	0	2	2	<10	<10	0	0	0	0	250
JUL												
07...	1350	2	1	0	2	<10	3	0	0	2	1	900

DATE	DIS-SOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	TOTAL MAN-GANESE (MN) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	TOTAL SELE-NIUM (SE) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	TOTAL ZINC (ZN) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	TOTAL ORGANIC CARBON (C) (MG/L)
OCT												
14...	40	7	7	10	10	<.5	<.5	0	0	0	0	6.2
JAN												
13...	40	3	--	10	0	<.5	<.5	0	0	20	20	6.5
APR												
21...	60	12	12	10	0	<.5	<.5	1	1	10	10	17
JUL												
07...	150	12	7	60	0	.0	.0	0	0	20	20	4.9

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

PERIPHYTON

DATE	LENGTH OF EXPO-SURE (DAYS)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)
JUL				
07...	22	800	.020	.007
AUG				
02...	26	7164	.275	.136

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	OCT 14,76		NOV 10,76		DEC 10,76		JAN 13,77		FEB 15,77	
TIME	1045		1030		1130		1410		1115	
TOTAL CELLS/ML	1900		270		250		140		19	
DIVERSITY: DIVISION	1.0		1.2		0.8		0.6		0.0	
.CLASS	1.0		1.2		0.8		0.6		0.0	
..ORDER	1.7		1.2		0.9		0.9		0.0	
...FAMILY	2.0		2.8		1.1		2.6		1.3	
....GENUS	2.2		3.1		1.1		2.6		1.9	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...OOCYSTACEAE										
....DICHOTOMOCOCCUS	--	-	--	-	--	-	--	-	--	-
...CHARACIACEAE										
....CHARACIUM	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
....SORASTRUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	160	8	11	4	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....SCENEDESMUS	62	3	23	8	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	--	-	--	-	9	6	--	-
....CHLOROGONIUM	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	--	-	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	--	-	9	6	--	-
....STAURASTRUM	--	-	--	-	--	-	--	-	--	-
...ZYGNEMATACEAE										
....MOUGEOTIA	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	16	1	--	-	3	1	4	3	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	40	15	--	-	--	-	5#	25
....COCCONEIS	16	1	--	-	--	-	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	9	6	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	--	-
....CYMBELLA	--	-	11	4	3	1	13	10	--	-
....EPITHEMIA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	57#	42	--	-
....OPEPHORA	--	-	--	-	--	-	--	-	--	-
...EUNOTIACEAE										
....EUNOTIA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....FRAGILARIA	--	-	45#	17	--	-	--	-	5#	25
....SYNEDRA	16	1	45#	17	15	6	--	-	7#	38
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	6	2	--	-	9	6	--	-
...MERIDIONACEAE										
....MERIDION	--	-	--	-	--	-	4	3	--	-
...NAVICULACEAE										
....MASTOGLOIA	--	-	--	-	--	-	--	-	--	-
....NAVICULA	110	6	23	8	--	-	22#	16	2	13
....NEIDIUM	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	47	2	23	8	43#	17	--	-	--	-
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	--	-
....OCHROMONAS	16	1	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 197
IDENTIFICATION OF PHYTOPLANKTON

DATE	OCT 14,76		NOV 10,76		DEC 10,76		JAN 13,77		FEB 15,77	
TIME	1045		1030		1130		1410		1115	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCOCCALES										
...CHROCOCCACEAE										
....AGMENELLUM	250	13	45#	17	--	-	--	-	--	-
....ANACYSTIS	120	7	--	-	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	1100#	57	--	-	190#	75	--	-	--	-
..CHROCOCCALES										
...CHROCOCCACEAE										
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	--	-	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-

DATE	MAY 25,77		JUN 15,77		JUL 7,77		AUG 2,77		SEP 6,77	
TIME	1010		1045		1350		1030		1135	
TOTAL CELLS/ML	140000		620		1500		400		740	
DIVERSITY: DIVISION	1.1		1.4		1.5		0.8		1.6	
.CLASS	1.3		1.4		1.5		0.8		1.6	
..ORDER	1.4		1.7		2.1		0.9		2.0	
...FAMILY	2.9		3.0		3.0		1.0		2.9	
....GENUS	3.2		3.2		0.0		1.8		3.4	

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...OOCYSTACEAE										
....DICHOTOMOCOCCUS	4700	3	--	-	--	-	--	-	--	-
...CHARACIACEAE										
....CHARACIUM	--	-	--	-	20	1	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	*	0	--	-	46	6
....SORASTRUM	*	0	--	-	110	7	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	3500	3	48	8	61	4	--	-	17	2
....DICTYOSPHAERIUM	9400	7	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	2400	2	4	1	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	*	0	--	-	23	3
....SELENASTRUM	*	0	--	-	--	-	--	-	--	-
....TETRAEDRON	*	0	4	1	--	-	--	-	11	2
...SCENEDESMACEAE										
....SCENEDESMUS	7100	5	200#	33	170	11	--	-	130#	17
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	--	-	*	0	--	-	6	1
....CHLAMYDOMONAS	--	-	4	1	14	1	--	-	--	-
....CHLOROGONIUM	1200	1	--	-	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	--	-	--	-	*	0	--	-	--	-
....COSMARIUM	*	0	4	1	14	1	6	1	--	-
....STAURASTRUM	--	-	--	-	*	0	--	-	--	-
...ZYGNEMATACEAE										
....MOUGEOTIA	*	0	--	-	--	-	--	-	--	-

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAY 25,77 1010		JUN 15,77 1045		JUL 7,77 1350		AUG 2,77 1030		SEP 6,77 1135	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	*	0	8	1	14	1	6	1	11	2
....STEPHANODISCUS	--	-	--	-	--	-	11	3	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	19000	13	40	6	82	5	--	-	17	2
....COCCONEIS	*	0	12	2	--	-	6	1	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	4	1	--	-	--	-	--	-
....CYMBELLA	2400	2	72	12	48	3	--	-	6	1
....EPITHEMIA	--	-	--	-	*	0	--	-	--	-
...DIATOMACEAE										
....DIATOMA	3500	3	4	1	--	-	--	-	--	-
....OPEPHORA	*	0	--	-	--	-	--	-	--	-
...EUNOTIACEAE										
....EUNOTIA	1200	1	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....FRAGILARIA	4700	3	--	-	27	2	--	-	46	6
....SYNEDRA	3500	3	4	1	27	2	--	-	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	*	0	4	1	*	0	--	-	--	-
...MERIDIONACEAE										
....MERIDION	*	0	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....MASTOGLOIA	1200	1	--	-	--	-	--	-	--	-
....NAVICULA	4700	3	36	6	27	2	33	8	17	2
....NEIDIUM	*	0	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	55000#	40	100#	17	68	5	--	-	160#	22
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	6	1
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	4700	3	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....DINORRYON	*	0	--	-	--	-	--	-	--	-
....OCHROMONAS	--	-	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCOCCALES										
...CHROCOCCACEAE										
....AGMENELLUM	--	-	--	-	380#	26	--	-	34	5
....ANACYSTIS	--	-	28	5	200	13	110#	28	46	6
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	24	4	--	-	--	-	--	-
...OSCILLATORIACEAE	--	-	--	-	200	14	--	-	--	-
....OSCILLATORIA	*	0	--	-	--	-	--	-	29	4
..CHROCOCCALES										
...CHROCOCCACEAE										
....GOMPHOSPHAERIA	--	-	--	-	--	-	220#	56	140#	18
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	4700	3	4	1	--	-	--	-	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	7100	5	8	1	--	-	--	-	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	6	1
....TRACHELOMONAS	*	0	--	-	--	-	6	1	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	353	349	351	350	349	349	478	478	478	422	412	416
2	356	352	354	349	345	347	482	478	480	412	406	409
3	359	351	355	350	349	349	479	479	479	411	407	408
4	357	350	354	352	347	349	479	479	479	407	400	405
5	352	342	347	348	343	345	479	444	464	408	403	405
6	345	333	339	346	341	343	444	423	431	408	404	406
7	336	331	333	354	343	349	430	423	427	411	407	408
8	339	333	337	388	353	366	440	426	436	411	407	408
9	344	339	341	376	364	370	446	439	443	415	411	413
10	345	343	344	379	365	374	444	435	439	413	410	412
11	350	345	347	394	361	376	454	445	451	414	411	413
12	352	350	351	371	360	366	446	443	444	415	412	414
13	351	346	348	387	370	376	457	446	452	417	412	416
14	350	345	348	392	364	380	450	432	444	415	410	---
15	349	348	349	395	371	387	430	421	426	414	411	---
16	350	348	349	407	390	403	426	416	422	415	411	---
17	349	347	349	407	391	397	416	408	413	416	412	---
18	353	349	351	399	388	394	408	403	406	413	406	---
19	350	337	342	391	389	390	410	400	404	409	405	---
20	337	334	336	391	389	390	412	401	408	408	399	---
21	345	336	339	390	382	385	416	413	415	404	399	---
22	346	341	343	397	377	389	417	415	416	404	399	---
23	345	342	343	400	387	393	416	412	414	400	395	---
24	347	343	345	415	402	411	414	407	412	395	385	---
25	345	340	343	407	397	404	407	404	406	393	389	---
26	340	336	337	396	376	385	408	405	407	398	390	---
27	340	334	337	376	366	374	411	408	409	404	398	---
28	346	340	344	411	378	399	411	408	409	399	393	---
29	347	346	346	434	411	427	416	411	413	397	392	---
30	348	342	346	479	437	464	419	412	416	396	391	---
31	348	346	347	---	---	---	423	417	420	393	388	---
MONTH	359	331	345	479	341	381	482	400	431	422	385	410
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	389	382		395	389	---	233	168	198	246	242	244
2	391	384		394	387	---	225	194	207	253	246	249
3	385	380		387	376	---	244	149	209	258	254	256
4	387	382		387	376	---	198	150	172	261	259	260
5	389	386		380	376	---	196	181	189	265	260	263
6	393	387		377	369	---	207	191	196	270	266	268
7	396	392		371	369	---	199	195	196	275	271	273
8	395	390		371	367	---	216	199	206	277	273	276
9	394	363		370	361	---	214	200	206	283	277	280
10	372	366		370	363	---	213	204	208	283	278	281
11	369	321		369	355	---	207	204	205	286	282	284
12	356	334		354	262	---	210	202	206	292	287	290
13	366	340		251	215	---	202	190	196	298	292	295
14	388	366		253	228	---	192	185	188	301	298	300
15	399	388		264	253	263	187	180	182	304	302	303
16	401	398		274	266	268	182	177	180	310	304	306
17	403	394		277	269	272	183	180	181	319	309	313
18	394	387		275	257	268	186	182	184	325	320	323
19	391	387		268	247	259	193	188	190	322	317	320
20	392	387		255	233	246	200	190	195	325	320	322
21	393	384		258	240	249	211	198	206	327	322	324
22	385	379		268	245	259	212	210	212	327	320	323
23	387	385		274	258	269	212	210	211	323	317	321
24	---	---		287	270	280	213	210	212	316	303	307
25	---	---		300	284	292	214	213	214	326	303	315
26	---	---		302	288	298	219	214	215	332	322	326
27	---	---		283	280	282	228	219	222	340	328	332
28	---	---		285	258	275	231	228	229	343	335	338
29	---	---		260	196	235	234	230	232	347	339	342
30	---	---		237	183	219	242	236	238	348	340	344
31	---	---		238	171	218	---	---	---	350	336	344
MONTH	403	321		395	171	261	244	149	203	350	242	301

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C). WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	340	326	333	322	312	316	319	311	316	344	332	338
2	345	329	340	327	321	324	326	310	318	342	317	331
3	333	322	329	332	324	328	335	323	329	316	281	295
4	319	296	307	343	330	335	326	308	316	291	265	275
5	300	295	297	345	330	336	318	310	314	269	265	268
6	296	271	285	338	318	324	328	314	322	270	267	268
7	273	268	270	320	306	312	325	318	322	279	271	276
8	274	265	269	312	306	310	326	322	323	285	279	282
9	279	270	274	320	310	317	328	324	326	297	285	291
10	278	275	276	322	314	319	333	328	330	297	295	297
11	283	277	278	325	317	322	347	329	337	302	297	300
12	290	280	284	329	319	323	337	330	333	305	299	300
13	298	289	292	337	326	331	340	327	333	316	306	311
14	303	296	299	334	308	328	334	326	330	326	312	315
15	308	295	306	320	302	312	340	331	335	315	309	313
16	315	306	310	318	308	312	337	325	328	313	306	310
17	318	310	314	316	303	309	339	325	330	318	307	314
18	323	305	312	305	298	304	342	334	338	319	313	316
19	326	315	319	311	286	298	340	336	339	323	294	312
20	334	323	328	313	297	304	339	331	334	317	292	303
21	340	329	336	315	300	307	336	328	332	297	281	288
22	348	332	341	317	311	314	336	325	331	285	277	282
23	348	340	344	323	316	321	335	330	333	281	278	280
24	349	339	344	329	309	321	339	333	336	287	275	281
25	352	316	336	329	316	320	342	338	340	292	240	258
26	351	327	343	332	326	330	345	326	332	245	241	243
27	356	320	338	339	331	334	338	321	327	243	240	242
28	329	318	323	344	329	337	343	340	341	247	242	244
29	324	321	323	339	334	338	346	341	344	250	242	244
30	324	312	319	343	333	338	353	345	349	251	243	247
31	---	---	---	328	315	321	356	332	349	---	---	---
MONTH	356	265	312	345	286	321	356	308	331	344	240	287

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	16.5	10.5	13.5	4.5	2.0	3.0	.0	.0	.0	.0	.0	.0
2	16.5	11.5	14.0	5.5	3.5	4.5	.0	.0	.0	.0	.0	.0
3	16.5	11.0	13.5	5.0	3.0	4.0	.0	.0	.0	.0	.0	.0
4	17.0	12.5	15.0	3.5	2.0	2.5	.0	.0	.0	.0	.0	.0
5	15.5	13.0	14.0	3.5	2.0	2.5	.0	.0	.0	.0	.0	.0
6	12.5	9.5	11.0	2.5	1.0	1.5	.0	.0	.0	.0	.0	.0
7	9.5	8.0	9.0	1.5	.5	1.0	.0	.0	.0	.0	.0	.0
8	9.0	6.0	7.5	1.0	.5	.5	.0	.0	.0	.0	.0	.0
9	10.5	6.0	8.0	1.0	.5	.5	.0	.0	.0	.0	.0	.0
10	10.5	8.0	9.0	1.5	.5	.5	.0	.0	.0	.0	.0	.0
11	11.5	6.5	9.0	.5	.5	.5	.0	.0	.0	.0	.0	.0
12	14.0	9.0	11.5	1.0	.5	.5	.0	.0	.0	.0	.0	.0
13	12.0	10.0	11.0	.5	.0	.0	.0	.0	.0	.0	.0	.0
14	9.5	7.0	8.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
15	8.5	6.5	7.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
16	6.5	4.5	5.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
17	6.0	3.5	4.5	1.0	.0	.0	.0	.0	.0	.0	.0	.0
18	4.0	2.5	3.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
19	3.0	2.0	3.0	.5	.0	.0	.0	.0	.0	.0	.0	.0
20	5.0	1.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
21	5.0	2.5	3.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
22	4.0	2.0	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
23	4.0	1.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
24	4.0	2.0	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
25	4.0	2.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
26	3.5	2.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
27	4.0	1.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	4.5	1.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	6.0	2.5	4.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
30	5.0	3.5	4.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
31	5.5	3.0	4.0	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	17.0	1.0	7.0	5.5	.0	.5	.0	.0	.0	.0	.0	.0

STREAMS TRIBUTARY TO LAKE MICHIGAN

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	.5	.0	.0	14.0	10.5	12.5
2	.0	.0	.0	.0	.0	.0	.5	.0	.0	14.5	9.5	12.0
3	.0	.0	.0	.0	.0	.0	1.0	.0	.5	13.5	9.5	12.0
4	.0	.0	.0	.0	.0	.0	.0	.0	.0	14.5	10.5	12.0
5	.0	.0	.0	.0	.0	.0	.5	.0	.0	14.5	11.5	13.0
6	.0	.0	.0	.0	.0	.0	1.0	.0	.5	14.5	12.0	13.5
7	.0	.0	.0	.0	.0	.0	.5	.0	.0	14.0	9.5	12.0
8	.0	.0	.0	.0	.0	.0	2.0	.0	1.0	13.5	10.5	12.0
9	.0	.0	.0	.0	.0	.0	2.5	.0	1.0	14.0	9.0	11.5
10	.0	.0	.0	.0	.0	.0	4.5	.0	2.0	14.0	10.5	12.5
11	.0	.0	.0	.0	.0	.0	7.5	.5	4.0	17.0	12.5	14.5
12	.0	.0	.0	.0	.0	.0	8.0	4.5	6.0	18.5	14.5	16.5
13	.0	.0	.0	.0	.0	.0	7.0	5.5	6.0	20.5	17.0	18.5
14	.0	.0	.0	.0	.0	.0	7.0	3.5	5.5	20.0	16.0	18.0
15	.0	.0	.0	.0	.0	.0	5.5	4.5	5.0	20.0	17.0	18.5
16	.0	.0	.0	.0	.0	.0	7.5	4.5	6.0	22.5	18.0	20.0
17	.0	.0	.0	.0	.0	.0	7.5	6.5	7.0	23.5	20.0	21.5
18	.0	.0	.0	.0	.0	.0	8.0	6.5	7.5	25.5	21.5	23.5
19	.0	.0	.0	.0	.0	.0	9.5	7.5	8.5	24.5	21.5	23.0
20	.0	.0	.0	.0	.0	.0	11.5	8.5	10.0	25.0	21.5	23.5
21	.0	.0	.0	.0	.0	.0	10.5	9.0	10.0	24.0	21.5	23.0
22	.0	.0	.0	.0	.0	.0	10.5	7.5	9.0	23.5	20.5	22.0
23	.0	.0	.0	.0	.0	.0	10.0	7.0	8.5	23.0	20.0	21.5
24	.0	.0	.0	.0	.0	.0	9.0	7.5	8.0	23.5	20.5	22.0
25	.0	.0	.0	.0	.0	.0	10.0	6.0	8.0	23.5	20.5	22.0
26	.0	.0	.0	.0	.0	.0	11.0	6.5	8.5	24.0	21.0	22.5
27	.0	.0	.0	.5	.0	.0	11.5	7.5	9.5	24.5	20.5	22.5
28	.0	.0	.0	.5	.0	.0	11.0	7.0	9.0	25.5	21.0	23.0
29	---	---	---	.5	.5	.5	12.0	6.5	9.5	23.0	21.0	22.0
30	---	---	---	.5	.5	.5	14.5	9.0	12.0	22.5	18.5	20.5
31	---	---	---	.5	.0	.0	---	---	---	20.0	17.0	18.5
MONTH	.0	.0	.0	.5	.0	.0	14.5	.0	5.5	25.5	9.0	18.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	17.0	14.0	16.0	19.0	16.5	17.5	23.0	20.0	21.5	23.0	21.0	22.0
2	17.0	12.0	14.5	21.0	15.0	18.0	24.0	19.0	21.0	22.0	19.5	20.5
3	18.5	14.0	16.5	21.5	18.5	20.0	21.5	19.5	20.5	20.0	17.5	19.0
4	21.5	17.0	19.5	25.0	20.0	22.5	20.0	18.5	19.5	19.5	17.0	18.0
5	21.5	18.5	19.0	27.0	23.0	25.0	22.5	18.5	20.5	18.5	17.5	18.0
6	19.5	16.5	18.0	26.0	23.5	25.0	23.5	20.0	21.5	18.0	16.0	17.0
7	17.5	15.5	16.5	25.0	22.5	24.0	25.5	21.0	23.0	17.5	15.5	16.5
8	18.5	15.5	17.0	26.0	22.5	24.5	26.0	22.5	24.0	18.0	16.0	17.0
9	18.5	14.0	16.5	25.0	21.0	22.5	23.0	20.5	21.5	19.5	17.5	18.5
10	17.5	15.5	16.5	22.5	19.0	21.0	23.0	20.0	21.0	18.0	15.5	17.0
11	17.5	15.5	16.0	23.5	21.0	22.5	23.5	19.5	21.0	18.0	15.0	16.0
12	19.5	14.5	17.0	25.5	22.0	24.0	24.0	17.5	20.5	16.0	15.0	15.5
13	20.0	15.5	17.5	26.0	22.0	24.0	24.0	20.0	21.5	16.5	15.5	16.0
14	22.5	16.5	19.5	27.0	22.5	24.5	24.0	18.0	20.5	16.5	13.5	15.5
15	20.5	18.5	19.5	27.5	23.5	25.5	22.0	17.5	19.5	16.5	15.0	15.5
16	21.5	19.5	20.5	26.5	24.0	25.0	19.5	18.0	18.5	16.5	16.0	16.0
17	23.5	18.0	21.0	27.5	24.5	26.0	21.5	16.0	18.0	17.0	16.0	16.5
18	24.0	21.0	22.0	26.5	24.0	25.0	19.5	16.0	17.5	17.0	16.5	16.5
19	23.5	20.0	21.5	29.0	23.5	26.5	20.0	16.0	18.0	17.0	16.0	17.0
20	24.5	20.5	22.0	29.5	27.0	28.5	19.5	16.0	17.5	16.0	13.5	14.0
21	24.5	19.5	21.5	28.0	25.0	26.5	21.0	17.5	19.0	14.5	11.5	13.0
22	24.5	19.5	21.5	26.0	21.5	24.0	20.0	16.5	18.0	14.0	12.0	12.5
23	21.5	19.5	20.5	27.0	21.5	24.0	20.0	16.0	17.5	13.5	12.5	13.0
24	24.0	19.0	21.5	27.5	23.5	25.0	21.0	15.0	17.5	13.5	13.5	13.5
25	25.5	20.0	22.5	25.5	21.5	23.5	21.5	15.5	18.0	15.0	12.5	13.5
26	25.5	20.5	23.0	25.5	19.5	22.0	22.5	17.5	19.5	14.5	13.0	13.5
27	24.5	22.5	23.5	26.0	20.0	22.5	26.0	20.5	23.0	14.0	13.0	13.5
28	24.0	21.0	22.5	21.5	20.5	21.0	25.0	23.0	24.0	15.0	13.5	14.0
29	23.5	20.5	22.0	25.0	20.0	22.0	25.0	20.5	22.5	14.5	13.5	13.5
30	22.5	19.5	21.0	24.5	20.0	22.0	24.0	19.5	21.5	13.5	11.5	12.5
31	---	---	---	25.0	21.0	22.5	23.0	21.0	21.5	---	---	---
MONTH	25.5	12.0	19.5	29.5	15.0	23.5	26.0	15.0	20.5	23.0	11.5	16.0

04060500 IRON RIVER AT CASPIAN, MI

LOCATION.--Lat 46°03'31", long 88°37'38", in SE¼ SW¼ sec.1, T.42 N., R.35 W., Iron County, Hydrologic Unit 04030106, on right bank 10 ft (3 m) downstream from bridge on County Highway 424 in Caspian, and 5.0 mi (8.0 km) upstream from mouth.

DRAINAGE AREA.--92.1 mi² (238.5 km²).

PERIOD OF RECORD.--March 1948 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,438.78 ft (438.540 m) above mean sea level. Prior to Sept. 25, 1969, nonrecording gage at site 10 ft (3 m) upstream at same datum.

REMARKS.--Records good except those for the winter period, which are fair. The average flow includes mine pumpage and sewage effluent. Pumpage rates have diminished over the years due to the closing of most mines. Remaining pumpage averages about 9 ft³/s (0.3 m³/s). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 87.0 ft³/s (2.464 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,430 ft³/s (40.5 m³/s) July 2, 1953, gage height, 10.20 ft (3.109 m); minimum, 25 ft³/s (0.71 m³/s) Mar. 29, 1969, gage height, 3.30 ft (1.006 m), result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 223 ft³/s (6.32 m³/s) Apr. 22, gage height, 6.09 ft (1.856 m); minimum, 44 ft³/s (1.25 m³/s) July 27, 28, gage height, 3.88 ft (1.183 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	55	55	52	56	60	64	104	82	64	62	63	146
2	53	56	54	56	60	62	99	78	67	58	63	92
3	53	55	54	58	62	62	96	75	58	63	61	74
4	54	55	56	58	62	65	96	75	63	62	62	88
5	56	55	56	58	62	65	92	76	60	79	59	90
6	54	56	58	58	62	65	88	77	61	67	57	95
7	53	55	58	58	62	67	86	73	59	59	54	98
8	54	51	58	58	62	68	80	71	59	57	53	83
9	55	57	58	58	63	71	83	70	57	54	51	77
10	55	55	58	58	63	71	98	68	56	54	53	70
11	56	55	58	58	63	72	133	67	57	54	52	67
12	54	55	60	58	64	106	140	66	57	50	50	91
13	53	55	60	58	64	121	176	64	56	51	54	82
14	53	56	61	58	64	114	168	63	57	51	52	70
15	55	56	60	58	64	118	133	61	54	55	51	65
16	55	59	61	58	64	106	134	62	57	53	65	67
17	55	60	62	58	64	91	127	62	64	53	61	68
18	56	60	61	58	63	92	128	58	60	51	56	68
19	55	61	61	58	63	84	152	61	59	50	53	112
20	55	61	61	58	63	79	149	61	58	49	50	105
21	57	61	64	58	64	76	168	60	54	48	51	89
22	57	60	62	60	61	74	210	62	54	46	51	84
23	56	61	61	60	61	74	155	62	55	45	51	88
24	56	59	60	60	63	70	121	58	56	47	49	110
25	56	62	60	60	63	69	111	55	60	47	47	142
26	56	64	60	60	63	73	102	53	55	45	49	133
27	56	64	60	60	63	101	97	53	57	46	66	107
28	56	59	58	60	64	118	90	53	61	50	65	96
29	57	50	58	60	---	187	86	53	59	52	61	92
30	58	52	56	60	---	168	85	51	60	49	52	87
31	57	---	56	60	---	125	---	55	---	72	186	---
TOTAL	1711	1720	1822	1814	1756	2778	3587	1985	1754	1679	1848	2736
MEAN	55.2	57.3	58.8	58.5	62.7	89.6	120	64.0	58.5	54.2	59.6	91.2
MAX	58	64	64	60	64	187	210	82	67	79	186	146
MIN	53	50	52	56	60	62	80	51	54	45	47	65

CAL YR 1976 TOTAL 33091 MEAN 90.4 MAX 410 MIN 48
WTR YR 1977 TOTAL 25190 MEAN 69.0 MAX 210 MIN 45

04061000 BRULE RIVER NEAR FLORENCE, WI

LOCATION.--Lat 45°57'31", long 88°15'57", in SE¼ SE¼ sec.11, T.41 N., R.32 W., Michigan meridian, Iron County, Hydrologic Unit 04030106, on left bank 40 ft (12 m) upstream from highway bridge, 1.0 mi (1.6 km) upstream from Paint River, 2.5 mi (4.0 km) north of Florence, and 5.0 mi (8.0 km) upstream from confluence with Michigamme River.

DRAINAGE AREA.--389 mi² (1,008 km²).

PERIOD OF RECORD.--January 1914 to February 1916, June 1944 to current year.

REVISED RECORDS.--WSP 1387: 1914-16. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,200.55 ft (365.928 m) above mean sea level (levels by Owen Ayres Associates). Prior to Aug. 29, 1944, nonrecording gage at bridge 40 ft (12 m) downstream at same datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Aug. 17-31, part of Sept. 1, 2, Sept. 3-30, which are fair. Discharge includes some mine pumpage (see sta. 04060500). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--34 years (water years 1915, 1945-77), 358 ft³/s (10.14 m³/s), 12.50 in/yr (318 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,700 ft³/s (133 m³/s) July 2, 1953, gage height, 6.57 ft (2.003 m); maximum gage height, 8.27 ft (2.521 m) Dec. 26, 1969, backwater from ice; minimum discharge, 118 ft³/s (3.34 m³/s) Dec. 2, 1963 (discharge measurement); minimum gage height, 1.79 ft (0.546 m) July 24, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 850 ft³/s (24.1 m³/s) Sept. 1, gage height, 3.15 ft (0.960 m); maximum gage height, 7.00 ft (2.134 m) Nov. 26, backwater from ice; minimum discharge, 167 ft³/s (4.73 m³/s) July 26, 27, 28, gage height, 1.82 ft (0.555 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	232	233	200	200	200	225	452	314	301	226	220	815
2	224	243	205	205	200	225	403	305	293	216	213	575
3	218	230	210	210	205	225	381	288	263	223	209	450
4	217	230	210	210	210	225	379	275	271	251	227	410
5	222	230	210	205	210	225	352	281	279	265	216	400
6	220	228	220	210	210	225	327	282	271	249	205	370
7	217	224	220	215	210	225	320	276	263	225	196	420
8	220	190	220	210	210	230	295	264	265	212	189	400
9	220	200	215	210	210	240	299	253	247	199	193	350
10	222	225	210	210	210	260	349	249	233	195	194	330
11	224	225	210	215	210	300	454	241	229	197	190	320
12	221	230	210	215	210	380	528	235	227	220	186	320
13	224	220	220	210	210	520	598	231	220	202	199	330
14	224	195	225	205	210	560	633	232	217	195	202	360
15	223	190	230	200	210	560	555	230	212	202	198	300
16	227	200	230	195	210	540	547	233	212	200	259	270
17	230	215	230	190	210	500	534	235	220	190	280	330
18	235	220	230	190	210	440	534	238	225	187	260	350
19	230	225	225	195	210	390	606	242	222	183	190	390
20	227	225	220	200	210	360	642	239	224	178	200	420
21	232	225	220	205	210	340	605	249	210	176	210	470
22	235	220	220	210	210	320	690	277	203	173	220	420
23	234	210	225	210	210	300	615	269	202	177	210	400
24	233	210	225	205	215	292	513	242	206	181	210	490
25	230	215	230	205	215	273	465	232	221	177	210	430
26	231	210	230	205	215	273	421	231	220	170	220	600
27	226	195	230	205	210	345	385	253	220	167	240	500
28	221	175	230	205	210	454	359	243	220	176	270	400
29	231	180	225	205	---	662	345	230	220	199	250	380
30	235	190	215	205	---	685	326	225	215	188	240	355
31	235	---	200	205	---	562	---	238	---	204	640	---
TOTAL	7020	6408	6800	6365	5870	11361	13912	7832	7031	6203	7146	12455
MEAN	226	214	219	205	210	366	464	253	234	200	231	415
MAX	235	243	230	215	215	685	690	314	301	265	640	815
MIN	217	175	200	190	200	225	295	225	202	167	186	270
CFSM	.58	.55	.56	.53	.54	.94	1.19	.65	.60	.51	.59	1.07
IN.	.67	.61	.65	.61	.56	1.09	1.33	.75	.67	.59	.68	1.19

CAL YR 1976 TOTAL 125622 MEAN 343 MAX 1240 MIN 175 CFSM .88 IN 12.01
WTR YR 1977 TOTAL 98403 MEAN 270 MAX 815 MIN 167 CFSM .69 IN 9.41

04061500 PAINT RIVER AT CRYSTAL FALLS, MI

LOCATION.--Lat 46°06'21", long 88°20'05", in SE¼ sec.20, T.43 N., R.32 W., Iron County, Hydrologic Unit 04030106, on right bank 150 ft (46 m) downstream from municipal powerplant at Crystal Falls, and 14.5 mi (23.3 km) upstream from mouth.

DRAINAGE AREA.--597 mi² (1,546 km²).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1174: 1947-48(m). WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,306.1 ft (398.1 m) above mean sea level (Wisconsin Electric Power Co. bench mark).

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Apr. 27 to June 1, which are fair. Diurnal fluctuation caused by powerplant immediately upstream; since storage capacity is small, daily flows are not affected appreciably. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--33 years, 587 ft³/s (16.62 m³/s), 13.35 in/yr (339 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,900 ft³/s (309 m³/s) Apr. 25, 1960, gage height, 9.82 ft (2.993 m); minimum, 7.7 ft³/s (0.22 m³/s) Sept. 17, 1950, gage height, 0.89 ft (0.271 m); minimum daily, 81 ft³/s (2.29 m³/s) Nov. 1, 1947.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,780 ft³/s (78.7 m³/s) Apr. 22, gage height, 4.96 ft (1.512 m); minimum, 124 ft³/s (3.51 m³/s) July 28, gage height, 1.78 ft (0.543 m); minimum daily, 157 ft³/s (4.45 m³/s) July 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	178	252	202	218	230	250	1290	900	285	268	312	702
2	175	251	211	224	235	250	1140	800	320	264	255	676
3	169	248	204	223	240	250	1020	650	307	271	247	552
4	167	253	208	226	240	250	981	580	304	295	263	524
5	171	254	222	227	240	250	900	560	298	351	284	764
6	166	254	221	226	245	250	791	560	309	376	262	882
7	167	237	228	227	250	250	750	560	313	346	246	989
8	169	172	216	230	250	250	679	520	280	308	208	911
9	184	217	218	230	250	250	633	470	289	284	194	802
10	199	275	215	225	250	275	661	440	275	261	186	726
11	194	244	222	220	250	300	833	410	265	237	187	650
12	197	240	222	220	250	350	1250	380	250	225	180	656
13	200	235	227	220	250	580	1640	370	250	207	185	690
14	190	221	217	210	249	950	1980	350	233	203	179	617
15	198	212	225	220	253	1000	2020	320	210	213	178	531
16	201	221	225	220	242	960	2070	300	213	241	211	487
17	211	240	229	230	238	900	2090	300	220	247	225	450
18	208	247	235	230	238	700	2050	300	221	245	220	435
19	208	237	234	230	245	600	2180	300	233	234	204	533
20	206	240	236	230	257	580	2480	310	241	195	189	683
21	223	229	226	225	242	550	2330	380	242	184	183	688
22	236	215	218	220	238	480	2600	370	216	177	178	631
23	249	206	220	230	245	470	2310	330	198	167	181	645
24	244	200	230	230	253	440	1930	300	202	169	175	706
25	241	237	218	230	249	415	1620	300	227	167	166	943
26	239	253	230	230	249	410	1350	300	222	165	166	1070
27	230	254	230	230	249	504	1150	300	217	157	185	1000
28	222	194	225	220	249	685	1100	300	226	165	214	920
29	243	174	220	220	---	1050	1000	300	249	180	220	850
30	252	196	220	225	---	1550	950	270	260	176	201	838
31	257	---	218	230	---	1460	---	250	---	226	470	---
TOTAL	6394	6908	6872	6976	6876	17459	43778	12780	7575	7204	6754	21551
MEAN	206	230	222	225	246	563	1459	412	253	232	218	718
MAX	257	275	236	230	257	1550	2600	900	320	376	470	1070
MIN	166	172	202	210	230	250	633	250	198	157	166	435
CFSM	.35	.39	.37	.38	.41	.94	2.44	.69	.42	.39	.37	1.20
IN.	.40	.43	.43	.43	.43	1.09	2.73	.80	.47	.45	.42	1.34

CAL YR 1976 TOTAL 179949 MEAN 492 MAX 3820 MIN 142 CFSM .82 IN 11.21
WTR YR 1977 TOTAL 151127 MEAN 414 MAX 2600 MIN 157 CFSM .69 IN 9.42

04062000 PAINT RIVER NEAR ALPHA, MI

LOCATION.--Lat 46°00'40", long 88°15'30", in NW¼ NW¼ sec.25, T.42 N., R.32 W., Iron County, Hydrologic Unit 04030106, on right bank 0.6 mi (1.0 km) downstream from Lower Paint Dam, 5.5 mi (8.8 km) upstream from Brule River, and 6.0 mi (9.7 km) southeast of Alpha.

DRAINAGE AREA.--631 mi² (1,634 km²).

PERIOD OF RECORD.--June 1952 to current year. Monthly discharge only for period October 1953 to September 1960, published in WSP 1727.

REVISED RECORDS.--WSP 1727: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,260 ft (384 m) from topographic map (nearest 10 ft).

REMARKS.--Records good. Flow completely regulated by powerplant and Lower Paint Dam, 0.6 mi (1.0 km) above station. Records not adjusted for diversion to Michigamme River by Paint River diversion canal. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 170 ft³/s (4.814 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,050 ft³/s (228 m³/s) July 2, 1953, gage height, 10.50 ft (3.200 m); minimum daily, 62 ft³/s (1.76 m³/s) Mar. 22, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,140 ft³/s (32.3 m³/s) Apr. 21, 22, gage height, 5.03 ft (1.533 m); minimum daily, 86 ft³/s (2.44 m³/s) Feb. 24 to Mar. 7; minimum gage height, 2.68 ft (0.817 m) Apr. 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	93	95	95	96	96	86	92	90	90	95	95	97
2	95	95	95	96	95	86	92	90	90	92	95	97
3	95	95	95	96	94	86	93	90	93	93	95	97
4	95	95	95	96	94	86	91	90	93	92	95	97
5	95	95	95	96	94	86	90	90	93	93	95	97
6	95	95	95	96	93	86	91	90	93	92	95	97
7	95	94	95	96	93	86	91	90	93	92	96	97
8	95	94	95	96	92	88	91	89	93	92	97	97
9	95	94	95	96	92	88	90	90	93	92	97	95
10	95	93	95	96	91	89	90	90	93	92	97	95
11	95	93	95	96	90	92	90	90	93	92	97	95
12	95	93	95	96	90	94	96	90	93	93	97	96
13	94	95	95	96	90	99	91	90	93	92	97	95
14	95	94	95	96	90	99	90	90	93	93	97	95
15	95	94	95	96	90	99	90	90	93	92	97	95
16	95	93	95	96	90	100	90	90	93	93	98	95
17	95	93	95	96	89	100	90	90	93	93	97	95
18	95	93	95	96	88	100	106	90	93	93	97	95
19	95	93	95	96	88	98	94	90	93	94	97	95
20	95	93	95	96	87	96	410	99	93	95	98	95
21	95	93	95	96	87	96	877	90	93	94	98	95
22	95	94	95	96	87	94	1100	91	93	95	98	95
23	95	94	95	96	87	92	1120	90	93	95	99	95
24	95	95	95	96	86	90	1080	90	92	95	99	96
25	95	93	95	96	86	90	1060	90	91	94	99	96
26	95	93	95	96	86	89	463	90	92	95	99	95
27	95	94	95	96	86	92	91	90	93	95	100	95
28	95	95	95	96	86	92	90	90	92	95	99	94
29	95	95	96	96	---	94	91	91	91	95	97	92
30	95	95	96	96	---	94	90	90	91	95	97	92
31	95	---	96	96	---	94	---	91	---	95	99	---
TOTAL	2942	2820	2948	2976	2517	2861	8220	2801	2775	2898	3013	2862
MEAN	94.9	94.0	95.1	96.0	89.9	92.3	274	90.4	92.5	93.5	97.2	95.4
MAX	95	95	96	96	96	100	1120	99	93	95	100	97
MIN	93	93	95	96	86	86	90	89	90	92	95	92

CAL YR 1976 TOTAL 66574 MEAN 182 MAX 2730 MIN 86
WTR YR 1977 TOTAL 39633 MEAN 109 MAX 1120 MIN 86

04062200 PESHEKEE RIVER NEAR CHAMPION, MI

LOCATION.--Lat 46°33'25", long 88°00'09", in NW¼ sec.13, T.48 N., R.30 W., Marquette County, Hydrologic Unit 04030107, on left bank 10 ft (3 m) downstream from bridge on County Road 607, 0.6 mi (1.0 km) downstream from West Branch, and 3.5 mi (5.6 km) northwest of Champion.

DRAINAGE AREA.--133 mi² (344 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1961 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,557.49 ft (474.723 m) above mean sea level. Prior to Aug. 15, 1961, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair.

AVERAGE DISCHARGE.--16 years, 208 ft³/s (5.891 m³/s), 21.24 in/yr (539 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,610 ft³/s (102 m³/s) May 8, 1965, gage height, 8.01 ft (2.441 m); minimum, 0.70 ft³/s (0.020 m³/s) Sept. 7, 8, 9, 10, 11, 1976, gage height, 1.10 ft (0.335 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 600 ft³/s (17.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 1	1300	1,020	28.9	4.57	1.393	Apr. 17	0300	*2,160	61.2	*6.10	1.859

Minimum daily discharge, 2.2 ft³/s (0.062 m³/s) Oct. 4-7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.3	10	11	10	10	11	927	259	52	49	25	83
2	2.3	10	11	10	10	11	765	222	68	73	21	98
3	2.3	10	11	10	10	12	624	192	71	125	23	88
4	2.2	10	11	10	10	12	517	170	70	195	27	149
5	2.2	10	11	10	10	12	427	161	64	193	25	216
6	2.2	10	11	10	10	13	380	163	74	162	22	229
7	2.2	10	11	10	10	15	360	151	75	125	18	239
8	2.5	10	11	10	10	17	340	136	74	94	15	204
9	2.7	10	11	10	10	21	334	120	64	71	14	180
10	3.0	10	11	10	10	25	336	109	54	56	23	166
11	3.4	10	11	10	10	30	549	101	45	45	28	145
12	3.5	10	11	10	10	45	1030	94	40	37	24	122
13	3.6	10	11	10	10	110	1730	86	34	31	28	103
14	3.8	10	11	10	10	200	1890	78	30	41	30	86
15	4.2	10	12	10	10	250	1940	71	27	126	31	73
16	5.0	10	12	10	10	270	2120	65	24	124	39	67
17	5.3	10	12	10	10	290	2100	61	25	138	47	64
18	5.5	10	12	11	10	310	1870	69	26	120	50	61
19	5.6	10	12	11	10	320	1780	78	25	95	41	85
20	6.0	10	12	11	10	300	1760	79	24	72	37	109
21	7.2	11	12	10	10	260	1620	99	21	56	36	132
22	8.0	11	12	10	10	240	1560	113	17	43	38	137
23	8.5	11	11	10	10	220	1250	112	15	34	37	152
24	9.0	11	11	10	10	190	918	97	15	27	32	179
25	9.4	11	11	10	10	170	740	80	18	23	29	267
26	9.6	11	11	10	10	160	604	66	15	19	23	286
27	9.8	11	11	10	11	200	501	56	17	15	25	272
28	10	11	11	10	11	300	420	53	26	15	26	257
29	10	11	10	10	---	400	355	46	29	16	26	263
30	10	11	10	10	---	700	303	39	33	14	26	268
31	10	---	10	10	---	850	---	37	---	27	41	---
TOTAL	171.3	310	346	313	282	5964	30050	3263	1172	2261	907	4780
MEAN	5.53	10.3	11.2	10.1	10.1	192	1002	105	39.1	72.9	29.3	159
MAX	10	11	12	11	11	850	2120	259	75	195	50	286
MIN	2.2	10	10	10	10	11	303	37	15	14	14	61
CFSM	.04	.08	.08	.08	.08	1.44	7.53	.79	.29	.55	.22	1.20
IN.	.05	.09	.10	.09	.08	1.67	8.40	.91	.33	.63	.25	1.34

CAL YR 1976 TOTAL 58044.21 MEAN 159 MAX 3470 MIN .71 CFSM 1.20 IN 16.23
WTR YR 1977 TOTAL 49819.30 MEAN 136 MAX 2120 MIN 2.2 CFSM 1.02 IN 13.93

04062200 PESHEKEE RIVER NEAR CHAMPION, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: August 1961 to current year.

INSTRUMENTATION.--Temperature recorder since Aug. 29, 1961.

REMARKS.--Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES (water years 1961, 1962, 1964-77): Maximum, 28.5°C July 1, 1966; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 24.0°C June 26, 27, July 14, 19, 20, 24; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	11.0	8.5	1.5	1.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
2	11.0	9.5	2.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	11.0	9.5	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	11.0	10.0	1.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	11.0	11.0	1.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	11.0	8.0	1.0	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0
7	8.0	7.0	0.5	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0
8	7.0	6.5	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0
9	7.0	6.5	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0
10	7.0	6.5	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0
11	8.0	6.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0
12	9.0	7.5	0.0	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0
13	8.5	6.5	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	6.5	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	4.5	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	4.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	3.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
18	3.0	1.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
19	2.5	1.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5
20	2.5	1.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0
21	2.5	2.0	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	1.0	1.0
22	2.5	1.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	1.5	1.0
23	2.0	1.0	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	1.5	1.5
24	1.5	1.0	0.5	0.5	1.0	0.5	0.0	0.0	0.0	0.0	1.5	1.5
25	1.5	1.0	0.5	0.0	1.0	1.0	0.0	0.0	0.0	0.0	2.0	1.5
26	1.0	0.5	0.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0	1.5	1.0
27	1.0	0.5	0.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	1.0
28	1.5	0.5	0.0	0.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	1.0
29	2.5	1.0	0.0	0.0	1.0	1.0	0.0	0.0	---	---	1.0	1.0
30	2.0	1.5	0.0	0.0	1.0	1.0	0.0	0.0	---	---	1.5	1.0
31	2.0	1.0	---	---	1.0	0.5	0.0	0.0	---	---	1.5	1.5
MONTH	11.0	0.5	2.5	0.0	1.0	0.0	0.5	0.0	0.0	0.0	2.0	0.0

04062200 PESHEKEE RIVER NEAR CHAMPION, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	1.5	1.5	11.5	10.5	18.0	15.5	19.5	17.0	20.0	17.5	17.5	16.0
2	1.5	1.5	11.5	9.5	17.0	13.0	19.0	14.5	21.0	17.5	16.5	15.0
3	1.5	1.5	12.0	9.5	18.5	14.5	18.5	17.0	19.5	17.5	15.5	13.5
4	1.5	1.5	12.0	10.5	20.5	17.5	18.5	17.5	19.5	17.0	15.0	14.0
5	2.0	1.5	13.0	11.5	20.0	17.5	19.5	18.5	19.0	17.0	14.0	13.5
6	2.5	2.0	13.0	12.0	18.5	16.0	20.0	19.0	20.0	15.5	13.5	13.0
7	2.5	2.5	13.0	10.0	18.0	15.0	21.0	19.5	21.0	17.0	13.0	12.5
8	2.5	2.5	13.5	11.0	17.5	14.5	21.5	20.0	21.5	18.0	13.0	13.0
9	3.0	2.5	13.5	10.5	18.0	14.0	21.0	18.5	20.5	16.5	13.5	13.0
10	3.5	2.5	13.0	10.5	17.5	14.5	20.0	16.5	18.5	16.5	13.5	12.5
11	4.5	3.5	14.0	10.0	16.0	15.0	20.5	18.0	18.0	15.0	13.5	12.0
12	4.5	3.5	16.0	12.0	18.0	14.5	20.5	18.5	16.5	14.0	13.0	12.0
13	4.5	4.0	17.0	14.0	18.0	14.0	23.0	18.5	18.5	15.5	12.5	12.0
14	5.5	4.5	18.0	14.5	18.5	13.0	24.0	19.5	17.5	14.0	13.0	11.0
15	6.5	5.5	18.5	16.0	19.0	16.0	21.5	19.5	16.5	14.0	12.5	11.0
16	8.0	6.5	19.5	16.5	19.0	17.0	21.0	19.0	15.5	14.5	12.5	11.5
17	8.0	7.0	20.0	17.5	20.0	16.0	21.5	19.5	14.5	13.0	12.0	12.0
18	8.0	7.0	21.5	18.0	20.0	18.0	22.0	20.5	14.5	12.0	13.0	12.0
19	9.0	8.0	21.0	19.0	19.5	17.0	24.0	21.5	15.5	12.5	13.0	12.0
20	10.0	9.0	20.5	18.5	21.0	17.0	24.0	23.0	15.0	13.0	12.0	10.0
21	10.0	9.0	20.0	18.5	21.0	16.0	23.0	20.0	15.0	14.0	10.5	9.0
22	9.0	8.0	19.5	18.0	21.5	16.0	23.0	18.0	14.5	12.5	10.0	10.0
23	9.5	8.5	19.5	18.0	21.5	18.5	23.5	20.0	14.0	11.5	10.0	10.0
24	9.5	7.5	20.5	17.5	21.0	18.5	24.0	20.5	14.5	11.0	10.0	10.0
25	8.5	7.0	21.0	18.0	22.5	18.0	22.5	19.0	15.0	11.0	10.0	10.0
26	9.0	7.5	21.5	18.0	24.0	18.0	21.5	17.0	15.0	14.0	10.0	10.0
27	9.5	9.0	22.5	18.5	24.0	20.5	21.0	17.5	17.0	15.0	10.0	10.0
28	9.0	8.0	22.0	19.0	22.5	20.0	20.5	18.5	17.5	17.0	10.5	10.0
29	9.0	7.5	21.5	18.5	22.0	18.0	22.0	18.0	18.0	15.0	10.5	10.0
30	11.0	8.5	21.5	18.0	21.5	18.5	21.0	18.0	18.0	15.0	10.0	10.0
31	---	---	21.5	18.0	---	---	21.0	19.0	18.0	16.0	---	---
MONTH	11.0	1.5	22.5	9.5	24.0	13.0	24.0	14.5	21.5	11.0	17.5	9.0

04062230 MICHIGAMME RIVER NEAR MICHIGAMME, MI

LOCATION.--Lat 46°28'00", long 88°04'28", in SW¼ SW¼ sec.16, T.47 N., R.30 W., Marquette County, Hydrologic Unit 04030107, on right bank 20 ft (6 m) upstream from Northern Natural Gas Co. pipeline, 0.6 mi (1.0 km) upstream from Spruce River, 1.2 mi (1.9 km) downstream from Lake Michigamme, and 5.0 mi (8.0 km) southeast of Michigamme.

DRAINAGE AREA.--194 mi² (502 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1968 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,520 ft (463 m) from topographic map (nearest 10 ft).

REMARKS.--Water-discharge record good except those for the winter period, which are poor.

AVERAGE DISCHARGE.--9 years, 278 ft³/s (7.873 m³/s), 19.46 in/yr (494 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,180 ft³/s (90.1 m³/s) Apr. 19, 1976, gage height, 7.77 ft (2.368 m); minimum, 2.8 ft³/s (0.079 m³/s) Sept. 30, 1976, gage height, 1.56 ft (0.475 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,950 ft³/s (55.2 m³/s) Apr. 21, gage height, 6.65 ft (2.027 m); minimum, 3.0 ft³/s (0.085 m³/s) Oct. 1, gage height, 1.57 ft (0.479 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.0	3.7	7.2	13	16	23	371	700	139	72	82	64
2	3.1	3.7	7.4	13	16	23	494	670	135	71	79	65
3	3.3	3.7	7.6	13	16	23	572	600	127	75	78	66
4	3.3	4.3	7.8	13	16	23	609	540	126	80	78	79
5	3.3	4.4	8.0	13	16	24	628	500	126	91	77	91
6	3.4	4.2	8.3	13	16	24	589	460	126	98	74	100
7	3.6	4.3	8.6	13	16	24	553	430	120	102	72	120
8	3.6	4.4	8.8	13	17	24	521	390	121	102	70	133
9	3.7	4.4	8.9	13	17	25	493	360	115	102	67	146
10	3.7	4.5	9.0	13	17	25	473	320	108	99	67	156
11	3.6	4.5	9.2	13	18	26	494	295	106	93	66	159
12	3.6	4.5	9.4	13	18	31	589	278	104	91	64	164
13	3.6	4.5	9.6	13	19	33	821	262	102	89	65	165
14	3.6	4.5	9.8	13	20	35	1060	249	99	88	63	161
15	3.6	4.5	9.9	13	21	38	1290	238	96	102	62	156
16	3.8	4.5	10	13	21	42	1490	229	93	112	66	154
17	3.9	4.5	10	13	22	45	1690	218	93	128	65	151
18	3.9	4.5	10	13	22	50	1810	211	91	132	64	147
19	3.9	4.6	10	13	22	55	1870	207	88	134	64	152
20	3.8	4.8	10	13	22	63	1910	209	86	134	63	151
21	3.7	5.2	11	14	22	70	1920	213	84	132	62	148
22	4.1	5.6	11	14	22	78	1900	209	81	121	61	151
23	4.0	5.6	11	14	22	86	1830	205	78	114	61	162
24	4.0	5.7	12	14	22	94	1690	205	78	109	60	177
25	4.0	5.7	12	15	22	103	1530	199	76	105	59	200
26	4.0	5.8	12	15	23	110	1370	191	73	97	59	225
27	4.0	6.0	12	15	23	121	1220	181	73	91	60	242
28	3.8	6.3	13	15	23	134	1100	171	74	88	60	254
29	3.7	6.6	13	16	---	175	1000	159	73	86	60	264
30	3.7	6.8	13	16	---	231	870	146	72	83	59	272
31	3.7	---	13	16	---	285	---	137	---	85	64	---
TOTAL	114.0	146.3	312.5	424	547	2143	32761	9382	2963	3106	2051	4675
MEAN	3.68	4.88	10.1	13.7	19.5	69.1	1092	303	98.8	100	66.2	156
MAX	4.1	6.8	13	16	23	285	1920	700	139	134	82	272
MIN	3.0	3.7	7.2	13	16	23	371	137	72	71	59	64
CFSM	.02	.03	.05	.07	.10	.36	5.63	1.56	.51	.52	.34	.80
IN.	.02	.03	.06	.08	.10	.41	6.28	1.80	.57	.60	.39	.90

CAL YR 1976 TOTAL 79186.5 MEAN 216 MAX 3110 MIN 2.9 CFSM 1.11 IN 15.18
WTR YR 1977 TOTAL 58624.8 MEAN 161 MAX 1920 MIN 3.0 CFSM .83 IN 11.24

04062230 MICHIGAMME RIVER NEAR MICHIGAMME, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1970 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (CA,MG) (MG/L)
OCT								
21...	0930	3.7	55	7.0	4.0	3.5	20	20
NOV								
23...	1050	5.6	57	6.9	-5.5	.5	32	19
DEC								
17...	0930	24	45	7.3	-3.0	.0	28	37
JAN								
18...	1250	9.2	55	7.1	-4.5	.0	30	21
FEB								
15...	1200	21	53	7.2	-10.0	.0	27	16
MAY								
16...	1200	227	50	7.4	28.0	14.5	30	19
JUN								
21...	0930	77	53	6.7	17.5	18.0	20	11
JUL								
19...	1015	135	55	7.2	30.5	23.5	40	21
AUG								
23...	1135	61	50	6.7	15.0	17.0	30	20
SEP								
07...	1115	118	60	6.9	15.5	17.0	30	20

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL IRON (FE) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL MANGANESE (MN) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)
OCT							
21...	5.0	1.9	.04	200	140	20	10
NOV							
23...	6.0	1.0	.10	190	110	20	10
DEC							
17...	10	3.0	.10	270	90	20	0
JAN							
18...	5.2	1.9	.11	210	100	20	20
FEB							
15...	4.6	1.1	.15	140	90	10	0
MAY							
16...	5.0	1.7	.25	170	120	30	20
JUN							
21...	1.7	1.7	.19	350	80	20	0
JUL							
19...	5.5	1.8	.18	140	100	10	10
AUG							
23...	5.4	1.6	.14	150	130	10	10
SEP							
07...	5.0	1.8	.15	80	20	--	0

04062400 MICHIGAMME RIVER NEAR WITCH LAKE, MI

LOCATION.--Lat 46°14'48", long 88°00'45", in NW¼ NW¼ sec.1, T.44 N., R.30 W., Dickinson County, Hydrologic Unit 04030107, on left bank 20 ft (6 m) upstream from bridge on county highway, 0.4 mi (0.6 km) upstream from Witch Lake Outlet, and 2.0 mi (3.2 km) south of Witch Lake.

DRAINAGE AREA.--316 mi² (818 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,384.25 ft (421.919 m) above mean sea level.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Occasional regulation caused by dam 14 mi (23 km) above station. Some flow diverted and returned above station by iron ore processing plant.

AVERAGE DISCHARGE.--13 years, 422 ft³/s (11.95 m³/s), 18.14 in/yr (461 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,360 ft³/s (123 m³/s) May 11, 1965, gage height, 11.60 ft (3.536 m); minimum, 23 ft³/s (0.65 m³/s) Nov. 15, 28, 1976; minimum gage height, 1.96 ft (0.597 m) Sept. 10, 11, 12, 13, Nov. 15, 1976.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,540 ft³/s (71.9 m³/s) Apr. 22, gage height, 8.53 ft (2.600 m); minimum, 23 ft³/s (0.65 m³/s) Nov. 15, 28; minimum gage height, 1.96 ft (0.597 m) Nov. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	26	30	26	27	29	47	623	1110	205	103	80	174
2	26	28	26	27	29	48	675	1010	203	115	78	159
3	25	28	26	27	30	48	744	904	187	121	80	147
4	25	30	26	26	31	48	877	784	155	124	84	161
5	27	30	27	26	32	49	884	746	131	119	80	188
6	26	30	27	25	32	50	869	663	159	118	78	191
7	26	30	27	25	33	52	811	593	191	149	143	292
8	27	27	28	25	34	60	775	530	143	155	188	263
9	27	28	28	25	35	80	718	459	134	266	136	195
10	27	31	28	25	36	100	717	457	146	218	84	180
11	28	30	28	25	37	157	772	443	180	107	73	241
12	27	31	29	25	38	203	848	364	160	80	87	299
13	28	31	30	25	39	400	1070	386	132	105	112	284
14	28	30	30	25	40	447	1330	352	98	117	109	230
15	28	28	31	25	42	457	1520	261	84	130	108	207
16	30	28	31	25	43	404	1750	252	89	125	109	208
17	30	27	31	25	43	402	1960	312	112	124	105	205
18	28	28	31	25	43	347	2140	281	159	142	99	215
19	30	30	31	25	43	302	2270	236	124	176	94	258
20	28	30	31	25	44	244	2370	238	70	179	102	275
21	30	30	31	25	45	225	2460	247	57	142	113	281
22	31	28	30	25	45	226	2540	245	98	120	111	252
23	31	28	30	25	45	197	2500	251	113	120	110	248
24	30	27	30	26	45	215	2350	274	106	131	100	272
25	27	28	30	26	46	202	2150	258	91	138	89	440
26	26	31	29	26	46	189	1930	197	83	131	77	521
27	26	30	29	26	46	224	1700	187	85	90	74	460
28	27	27	29	27	47	278	1520	187	93	84	72	438
29	27	26	28	27	---	407	1360	181	90	84	90	428
30	28	26	28	28	---	571	1240	173	92	83	104	436
31	27	---	28	28	---	628	---	181	---	92	152	---
TOTAL	857	866	894	797	1098	7307	43473	12762	3770	3988	3121	8148
MEAN	27.6	28.9	28.8	25.7	39.2	236	1449	412	126	129	101	272
MAX	31	31	31	28	47	628	2540	1110	205	266	188	521
MIN	25	26	26	25	29	47	623	173	57	80	72	147
CFSM	.09	.09	.09	.08	.12	.75	4.59	1.30	.40	.41	.32	.86
IN.	.10	.10	.11	.09	.13	.86	5.12	1.50	.44	.47	.37	.96

CAL YR 1976 TOTAL 116245 MEAN 318 MAX 4010 MIN 25 CFSM 1.01 IN 13.68
WTR YR 1977 TOTAL 87081 MEAN 239 MAX 2540 MIN 25 CFSM .76 IN 10.25

04062400 MICHIGAMME RIVER NEAR WITCH LAKE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1965 to current year.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (CA,MG) (MG/L)
OCT								
21...	1115	27	239	57.7	6.5	4.0	10	140
NOV								
23...	1230	28	252	7.4	-3.0	.5	15	120
DEC								
17...	1150	31	247	7.6	-3.0	.0	18	130
JAN								
18...	1430	25	267	7.6	-4.0	.0	10	130
FEB								
15...	1430	42	219	7.6	-10.5	.0	15	93
MAR								
16...	0950	419	162	7.6	.0	.0	30	62
MAY								
05...	1015	754	63	6.7	10.0	10.5	35	27
16...	1500	255	92	7.9	26.5	19.5	20	41
JUN								
21...	1100	56	123	7.3	22.0	18.5	10	60
JUL								
19...	1145	179	120	7.5	33.0	26.0	30	52
AUG								
23...	0920	110	128	7.0	16.0	15.0	20	53
SEP								
07...	1430	310	120	7.4	17.5	15.5	45	50

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL IRON (FE) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL MANGANESE (MN) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)
OCT							
21...	38	12	.11	340	180	70	70
NOV							
23...	28	12	.19	600	200	150	130
DEC							
17...	30	13	.21	600	180	160	150
JAN							
18...	30	13	.20	540	150	130	130
FEB							
15...	22	9.3	.69	490	250	120	120
MAR							
16...	14	6.6	.92	770	220	170	130
MAY							
05...	7.0	2.6	.29	300	170	40	40
16...	10	4.0	.17	340	190	70	50
JUN							
21...	14	6.0	.13	350	150	80	70
JUL							
19...	13	4.8	.13	500	240	60	30
AUG							
23...	13	4.9	.07	280	180	30	30
SEP							
07...	12	4.8	.17	--	180	--	20

04062500 MICHIGAMME RIVER NEAR CRYSTAL FALLS, MI

LOCATION.--Lat 46°06'50", long 88°12'57", in NW¼ sec.20, T.43 N., R.31 W., Iron County, Hydrologic Unit 04030107, on right bank 400 ft (122 m) upstream from highway bridge, 5.0 mi (8.0 km) downstream from Michigamme Reservoir, 6.0 mi (9.7 km) east of Crystal Falls and 15 mi (24 km) upstream from confluence with Brule River.

DRAINAGE AREA.--656 mi² (1,699 km²).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,300 ft (396 m) from topographic map (nearest 10 ft).

REMARKS.--Records excellent. Flow regulated by powerplant and by Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm³), 5 mi (8 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--33 years, 694 ft³/s (19.65 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,260 ft³/s (206 m³/s) Apr. 28, 1960, gage height, 10.73 ft (3.271 m); minimum daily, 71 ft³/s (2.01 m³/s) Nov. 26, 1950.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,450 ft³/s (69.4 m³/s) Apr. 24, gage height, 6.64 ft (2.024 m); minimum, 98 ft³/s (2.78 m³/s) Mar. 3, Aug. 31, gage height, 1.42 ft (0.433 m); minimum daily, 118 ft³/s (3.34 m³/s) Mar. 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	223	273	462	436	461	409	133	1220	606	137	512	150
2	138	272	453	435	486	342	135	1210	598	134	567	156
3	140	275	459	435	484	181	131	1190	472	137	312	144
4	286	272	457	434	482	171	135	1180	156	136	138	146
5	280	276	456	433	480	134	132	1070	154	140	137	143
6	279	136	458	433	479	134	130	700	427	138	136	147
7	280	138	455	338	477	143	131	697	595	135	136	138
8	280	272	454	153	476	141	129	644	592	138	135	134
9	157	279	452	151	474	146	130	605	591	134	135	133
10	140	274	453	318	480	149	135	604	468	134	136	127
11	278	277	450	443	511	147	134	603	160	390	391	130
12	279	273	451	440	548	143	130	602	160	593	568	137
13	281	388	449	440	545	141	158	602	412	587	305	137
14	286	294	449	436	542	135	149	602	586	588	133	134
15	282	277	447	436	539	141	148	601	583	321	395	131
16	148	274	447	436	536	137	155	600	586	139	574	133
17	143	148	367	432	534	141	165	606	582	139	314	132
18	282	284	152	436	527	148	164	603	584	409	136	132
19	271	243	151	446	524	146	399	602	581	593	135	146
20	275	147	348	446	504	150	909	600	581	584	134	145
21	279	152	443	338	505	149	1180	602	578	581	135	139
22	135	283	443	149	509	150	1720	337	580	318	363	136
23	137	275	440	145	514	150	2250	463	582	145	570	413
24	137	275	255	332	507	150	2330	598	587	145	568	626
25	279	141	158	436	494	150	1700	595	584	403	567	632
26	269	144	159	450	484	152	1190	596	582	573	310	629
27	269	142	343	462	469	136	1190	596	588	574	140	620
28	273	140	443	458	443	118	1460	596	326	569	137	611
29	272	350	440	457	---	154	1440	326	137	576	248	610
30	135	462	438	456	---	144	1220	168	138	500	310	605
31	136	---	437	455	---	127	---	441	---	448	290	---
TOTAL	7049	7436	12269	12095	14014	4959	19512	20459	14156	10538	9067	7796
MEAN	227	248	396	390	501	160	650	660	472	340	292	260
MAX	286	462	462	462	548	409	2330	1220	606	593	574	632
MIN	135	136	151	145	443	118	129	168	137	134	133	127

CAL YR 1976 TOTAL 234571 MEAN 641 MAX 5130 MIN 128
WTR YR 1977 TOTAL 139350 MEAN 382 MAX 2330 MIN 118

04063000 MENOMINEE RIVER NEAR FLORENCE, WI

LOCATION.--Lat 45°57'04", long 88°11'13", in NE¼ sec.16, T.41 N., R.31 W., Michigan meridian, Iron County, Hydrologic Unit 04030108, on left bank 0.5 mi (0.8 km) downstream from confluence of Brule and Michigamme Rivers, 3.5 mi (5.6 km) northeast of Florence, and at mile 117 (188 km).

DRAINAGE AREA.--1,780 mi² (4,610 km²).

PERIOD OF RECORD.--January 1914 to current year. Published as "at Twin Falls near Iron Mountain, MI" 1914-57. Records published for both sites July 1950 to September 1957.

REVISED RECORDS.--WSP 1707: 1953(M). WSP 1911: Drainage area of former site.

GAGE.--Water-stage recorder. Datum of gage is 1,119.23 (341.141 m) above mean sea level (levels by Owen Ayres Associates). Prior to July 1950, headwater and tailwater gages and generation data entered hourly in daily log sheets by company employees at the Twin Falls Powerplant of Wisconsin Electric Power Co., 10.4 mi (16.7 km) downstream.

REMARKS.--Records excellent except those for the winter period, which are fair. Prior to July 1950, discharge determined from power-plant records computed on basis of load-discharge rating of hydroelectric units and rating for tailwater gage during periods of spill. Rating developed by Geological Survey. Flow regulated by powerplants, Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm³), and Peavy Pond, capacity, 33,860 acre-ft (41.7 hm³), on Michigamme River, and by many smaller reservoirs above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--63 years, 1,793 ft³/s (50.78 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 19,500 ft³/s (552 m³/s) Apr. 26, 1960, gage height, 14.15 ft (4.313 m); minimum, 38 ft³/s (1.08 m³/s) Aug. 21, 1962, Sept. 26, 1975; minimum gage height, 1.18 ft (0.360 m) Aug. 21, 1962, Nov. 4, 1965; minimum daily discharge, 57 ft³/s (1.61 m³/s) Sept. 26, 1975.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,270 ft³/s (121 m³/s) Apr. 23, gage height, 6.35 ft (1.935 m); minimum, 230 ft³/s (6.51 m³/s) May 27, gage height, 1.90 ft (0.579 m); minimum daily, 537 ft³/s (15.2 m³/s) Aug. 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	811	842	984	680	1000	1310	1380	2710	1220	912	911	1700
2	760	829	1120	920	1050	1400	1270	2650	1170	793	956	1730
3	802	773	1020	1060	1150	1260	1420	2300	890	724	811	1430
4	761	825	899	1050	1050	1170	1380	2100	988	595	947	1590
5	825	866	992	950	950	1250	1690	2010	790	1040	924	1600
6	766	632	1070	1000	860	1290	1830	1550	1260	937	693	1540
7	864	600	1030	1020	1100	1260	2370	1460	1180	909	739	1660
8	790	786	1080	800	1050	1590	2430	1320	1230	895	704	1640
9	639	797	1020	820	1050	1520	2450	1340	1220	730	977	1560
10	617	888	1020	1000	1150	1660	2010	1210	1140	863	933	1370
11	891	728	957	1020	1100	1720	1730	1080	1010	896	985	816
12	795	727	1100	1040	1220	2130	1230	1230	914	862	982	1180
13	738	812	1260	1020	1080	2120	1340	1230	1120	877	724	1230
14	860	751	1110	940	1170	2070	1740	740	1150	912	700	1180
15	759	835	1120	680	1190	1830	1810	820	1200	848	894	1080
16	607	867	856	800	1170	1670	1710	1130	988	696	824	984
17	750	829	848	1000	1150	1870	2080	1370	1110	572	811	1100
18	886	768	825	930	1120	2250	2090	1060	754	837	891	983
19	804	671	725	1000	1160	1950	2150	1330	890	1000	866	1520
20	683	748	1040	1000	946	1830	3000	1540	1270	909	537	1580
21	676	742	987	950	1250	1680	3980	995	1140	942	776	1640
22	812	882	1010	800	1330	1600	4120	1060	1070	973	939	1790
23	703	787	864	780	1680	1830	4190	1610	1000	695	890	1950
24	717	851	916	900	1270	1880	4150	1320	1020	913	903	1760
25	758	690	789	950	1370	1790	4170	1300	707	962	915	1700
26	692	774	679	880	1420	1540	3560	1220	915	894	965	2530
27	758	731	1150	1050	1080	1150	2720	1170	1080	912	543	2240
28	671	761	1020	950	1230	1640	2740	736	1000	903	717	2470
29	723	865	1040	800	---	1820	2660	902	981	830	963	2650
30	779	966	945	850	---	1090	2830	921	971	727	852	2320
31	746	---	850	1000	---	1220	---	1260	---	697	976	---
TOTAL	23435	23463	30250	28560	32346	50390	72230	42674	31378	26255	26168	48523
MEAN	756	782	976	921	1155	1625	2408	1377	1046	847	844	1617
MAX	891	966	1260	1060	1680	2250	4190	2710	1270	1040	982	2650
MIN	607	600	679	680	860	1090	1230	736	707	572	537	816

CAL YR 1976 TOTAL 610323 MEAN 1668 MAX 9970 MIN 600
WTR YR 1977 TOTAL 435672 MEAN 1194 MAX 4190 MIN 537

04065300 WEST BRANCH STURGEON RIVER NEAR RANDVILLE, MI

LOCATION.--Lat 46°00'45", long 87°58'41", in NE¼ sec.30, T.42 N., R.29 W., Dickinson County, Hydrologic Unit 04030108, on right bank 500 ft (152 m) downstream from county highway bridge, 3.0 mi (4.8 km) downstream from Tom Kings Creek, and 4.0 mi (6.4 km) northeast of Randville.

DRAINAGE AREA.--56.1 mi² (145.3 km²).

PERIOD OF RECORD.--August 1958 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Sharp-crested weir since Aug. 6, 1976. Altitude of gage is 1,170 ft (357 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for period of indefinite stage-discharge relation, Oct. 1 to Nov. 9, which are fair. Since December 1958, diversion above station for industrial use; figures of runoff adjusted thereafter. Small diversions for sprinkler irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 43.0 ft³/s (1.218 m³/s), 10.41 in/yr (264 mm/yr), adjusted for industrial diversion.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 570 ft³/s (16.1 m³/s) May 7, 1960, gage height, 6.40 ft (1.951 m); minimum, 1.5 ft³/s (0.042 m³/s) July 22, 1964, gage height, 1.35 ft (0.411 m); minimum daily, 3.4 ft³/s (0.096 m³/s) July 22, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 215 ft³/s (6.09 m³/s) Mar. 30, gage height, 4.95 ft (1.509 m); minimum, 2.0 ft³/s (0.057 m³/s) July 28, gage height, 2.98 ft (0.908 m); minimum daily, 4.0 ft³/s (0.11 m³/s) July 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	11	7.8	8.3	10	9.3	99	29	31	12	20	74
2	9.0	12	7.5	8.6	10	9.2	71	28	36	10	16	70
3	8.5	12	7.5	8.8	10	9.3	64	25	25	12	14	41
4	8.0	12	9.5	9.0	10	9.4	60	23	27	15	15	31
5	8.0	12	10	9.0	10	9.5	54	27	29	27	14	31
6	8.0	13	11	9.0	9.8	9.7	43	32	27	31	13	34
7	8.0	13	9.8	8.8	9.5	10	42	28	25	21	11	43
8	8.5	13	10	8.6	9.5	10	28	25	25	15	9.0	37
9	8.5	14	9.7	8.1	9.7	11	31	22	19	13	5.3	26
10	9.0	14	11	7.7	9.8	13	46	20	16	11	8.4	19
11	9.5	13	10	7.6	10	16	86	18	15	9.0	9.7	17
12	10	13	11	8.9	10	35	110	17	14	8.6	7.7	28
13	10	13	11	9.5	11	84	132	16	12	8.5	8.3	33
14	10	12	11	9.4	10	149	174	16	11	8.6	9.2	26
15	11	12	11	9.5	9.7	192	137	15	11	9.6	8.8	20
16	11	13	12	9.5	9.2	151	120	16	9.9	9.2	19	21
17	10	12	12	8.6	9.4	84	113	21	11	8.7	22	30
18	10	14	12	8.2	9.8	72	104	31	11	7.2	16	29
19	10	14	12	9.5	9.4	50	107	21	9.9	7.4	12	60
20	10	14	13	9.8	9.0	45	120	20	9.9	8.6	9.5	76
21	10	14	12	10	9.3	38	112	26	8.7	7.7	8.6	61
22	10	12	11	10	10	35	123	34	7.9	6.5	8.3	44
23	11	11	9.7	10	9.8	35	107	26	8.2	6.8	9.3	48
24	11	9.8	9.4	10	11	24	78	20	9.4	7.9	9.0	67
25	11	11	9.4	10	12	14	65	17	11	9.1	8.6	115
26	11	11	9.3	10	10	16	54	15	9.7	7.5	8.6	138
27	11	12	9.2	10	9.8	28	47	13	9.7	4.0	16	107
28	11	10	9.2	11	9.7	54	40	12	13	5.6	16	75
29	11	9.8	8.9	10	---	117	35	11	10	8.4	14	59
30	11	8.9	8.6	10	---	195	31	9.8	9.6	9.1	12	50
31	11	---	8.3	10	---	164	---	12	---	25	34	---
TOTAL	306.0	365.5	313.8	287.4	277.4	1698.4	2433	645.8	471.9	350.0	392.3	1510
MEAN	9.87	12.2	10.1	9.27	9.91	54.8	81.1	20.8	15.7	11.3	12.7	50.3
MAX	11	14	13	11	12	195	174	34	36	31	34	138
MIN	8.0	8.9	7.5	7.6	9.0	9.2	28	9.8	7.9	4.0	5.3	17
+	3.0	4.1	4.3	4.6	3.9	5.9	5.1	5.7	5.3	3.5	3.9	5.5
MEAN‡	12.9	16.3	14.4	13.9	13.8	60.7	86.2	26.5	21.0	14.8	16.6	55.8
CFSM‡	.23	.29	.26	.25	.25	1.08	1.54	.47	.37	.26	.30	.99
IN‡	.26	.32	.30	.29	.26	1.25	1.71	.55	.42	.30	.34	1.11

CAL YR 1976 TOTAL 15392.4 MEAN 42.1 MAX 375 MIN 5.8 MEAN‡ 46.7 CFSM‡ .83 IN‡ 11.35
WTR YR 1977 TOTAL 9051.5 MEAN 24.8 MAX 195 MIN 4.0 MEAN‡ 29.4 CFSM‡ .52 IN‡ 7.11

+Average monthly diversion, equivalent in cubic feet per second, for industrial use; furnished by Hanna Mining Co.
‡Adjusted for diversion.

04065393 EAST BRANCH STURGEON RIVER BELOW SKUNK CREEK, NEAR FELCH, MI

LOCATION.--Lat 46°01'34", long 87°49'56", in NW¼ NE¼ sec.20, T.42 N., R.28 W., Dickinson County, Hydrologic Unit 04030108, on right bank 50 ft (15 m) downstream from Skunk Creek, and 2.2 mi (3.5 km) north of Felch.

DRAINAGE AREA.--61.8 mi² (160 km²).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1972, 1973. October 1973 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,069.53 ft (325.993 m) above mean sea level. Prior to December 20, 1973, nonrecording gage at same site and datum.

REMARKS.--Records fair. Since June 1975, occasional regulation during low flows by Gene Lake Reservoir (usable capacity, 3,990 acre-ft or 4.92 hm³) 3 mi (5 km) above station. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 612 ft³/s (17.3 m³/s) Apr. 24, 1975, gage height, 4.26 ft (1.298 m); minimum, 3.4 ft (0.096 m³/s) Sept. 7, 8, 9, 13, 1976.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 230 ft³/s (6.51 m³/s) Apr. 15, gage height, 3.17 ft (0.966 m); minimum, 3.5 ft³/s (0.099 m³/s) Oct. 2, 3, 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.2	9.3	9.0	10	11	11	143	48	36	16	11	75
2	3.6	12	8.5	10	11	11	119	44	34	14	10	46
3	3.5	11	8.5	10	11	11	106	40	29	17	9.5	33
4	3.8	10	10	9.5	11	11	96	36	31	20	10	34
5	4.4	9.2	11	9.5	11	11	83	35	32	55	11	34
6	6.3	7.6	12	9.5	11	11	80	34	36	63	9.5	37
7	6.0	7.0	12	9.5	11	11	65	32	34	44	21	44
8	5.8	7.0	12	9.5	11	12	56	29	32	33	18	35
9	5.8	6.9	12	9.0	11	13	54	24	26	28	7.0	28
10	5.6	6.8	12	9.0	11	20	64	22	23	23	8.8	21
11	15	6.8	12	9.0	11	47	87	21	22	19	8.8	17
12	17	6.8	12	9.0	11	64	123	19	19	17	7.2	28
13	13	7.0	12	9.5	11	111	170	18	17	15	7.5	26
14	7.6	7.4	13	9.5	11	145	223	20	15	14	7.5	22
15	6.6	7.6	13	10	11	179	226	18	14	14	7.2	17
16	6.3	7.7	13	10	11	184	224	18	15	13	15	21
17	6.1	7.7	14	10	11	155	204	17	13	12	15	29
18	5.3	7.8	14	10	11	108	200	18	13	12	12	26
19	5.2	8.2	14	11	11	75	188	18	12	11	11	83
20	5.2	8.3	14	11	11	56	174	23	12	10	10	114
21	5.3	8.9	13	11	11	46	164	48	11	9.8	9.8	101
22	5.7	9.6	13	11	11	40	187	47	10	10	9.5	78
23	5.8	10	12	11	11	37	185	38	9.5	35	9.5	85
24	5.8	11	11	11	11	33	162	32	10	7.8	8.8	104
25	5.8	11	11	11	11	29	132	27	22	7.2	8.2	152
26	6.0	11	11	11	11	27	107	23	17	7.0	8.2	166
27	6.0	11	11	11	11	35	88	20	15	6.4	12	155
28	5.6	11	11	11	11	48	72	18	19	6.4	13	128
29	5.8	11	10	11	---	111	61	16	17	6.6	11	106
30	5.8	10	10	11	---	161	55	14	15	5.8	9.8	88
31	6.0	---	10	11	---	170	---	15	---	14	42	---
TOTAL	199.9	266.5	361.0	315.5	308	1983	3893	832	612.5	566.0	358.8	1933
MEAN	6.45	8.89	11.6	10.2	11.0	64.0	130	26.8	20.4	18.3	11.6	64.4
MAX	17	12	14	11	11	184	226	48	36	63	42	166
MIN	3.5	6.8	8.5	9.0	11	11	54	14	9.5	5.8	7.0	17
CFSM	.10	.14	.19	.17	.18	1.04	2.10	.43	.33	.30	.19	1.04
IN.	.12	.16	.22	.19	.19	1.19	2.35	.50	.37	.34	.22	1.16

CAL YR 1976 TOTAL 19616.5 MEAN 53.6 MAX 430 MIN 3.4 CFSM .87 IN 11.81
WTR YR 1977 TOTAL 11634.3 MEAN 31.9 MAX 226 MIN 3.5 CFSM .52 IN 7.00

04065500 STURGEON RIVER NEAR FOSTER CITY, MI

LOCATION.--Lat 45°54'30", long 87°45'15", in NW¼ sec.36, T.41 N., R.28 W., Dickinson County, Hydrologic Unit 04030108, on left bank 30 ft (9 m) downstream from bridge on County Highway S69, 1.8 mi (2.9 km) downstream from confluence of East and West Branches, and 4.0 mi (6.4 km) south of Foster City.

DRAINAGE AREA.--237 mi² (614 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1954 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 966.6 ft (294.620 m) above mean sea level.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Since December 1958, diversion above station for industrial use; figures of runoff adjusted thereafter. Since June 1975, occasional regulation during low flows by Gene Lake Reservoir in headwaters of East Branch (see station 04065393). The refilling of Hardwood Reservoir on East Branch Sturgeon River, 9 mi (14 km) above station, stored 1,200 acre-ft (1.48 hm³) during the year. Small diversions for sprinkler irrigation.

AVERAGE DISCHARGE.--23 years, 184 ft³/s (5.211 m³/s), 10.54 in/yr (268 mm/yr), adjusted for industrial diversion.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,570 ft³/s (72.8 m³/s) May 8, 1960, gage height, 10.35 ft (3.155 m); minimum, 15 ft³/s (0.42 m³/s) July 24, 1964; minimum gage height, 1.96 ft (0.597 m) Aug. 21, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 728 ft³/s (20.6 m³/s) Apr. 16, gage height, 5.95 ft (1.814 m); minimum, 23 ft³/s (0.65 m³/s) Oct. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32	36	31	28	32	37	448	215	134	76	57	136
2	29	38	31	28	32	36	427	205	189	71	70	180
3	27	39	32	29	32	35	376	188	179	71	62	188
4	25	43	32	29	32	36	362	167	168	85	57	168
5	24	43	33	30	32	36	328	148	168	176	54	137
6	25	42	33	30	32	36	267	147	161	249	51	128
7	25	41	33	30	32	37	261	143	148	239	46	142
8	28	42	33	29	31	38	221	133	140	215	41	148
9	29	43	34	28	31	39	216	119	129	182	36	140
10	28	42	35	28	31	40	233	108	114	148	37	114
11	29	45	35	27	31	50	303	98	99	111	34	94
12	29	46	36	27	31	100	372	91	88	89	34	98
13	33	44	36	27	31	180	481	87	77	76	34	107
14	39	42	37	28	31	250	665	88	69	66	32	113
15	39	41	38	28	31	350	698	85	63	63	32	105
16	35	41	39	28	31	430	724	82	59	67	44	98
17	32	38	39	29	31	450	694	79	57	64	59	109
18	32	38	40	29	30	450	661	79	57	56	68	116
19	31	39	40	30	30	430	632	86	56	52	62	176
20	31	40	40	30	30	400	593	88	51	46	50	245
21	32	45	38	31	31	370	579	147	47	41	43	257
22	33	42	36	31	31	320	630	191	43	37	38	250
23	33	37	35	32	33	280	597	187	40	34	34	238
24	35	35	33	32	35	240	539	167	39	32	31	259
25	36	35	32	33	36	210	472	165	47	31	30	351
26	35	36	32	33	36	170	412	130	59	29	34	389
27	35	35	31	33	37	150	363	99	65	28	42	385
28	35	34	30	33	37	216	313	82	87	26	44	370
29	35	32	29	33	---	319	264	71	89	25	48	340
30	35	31	29	33	---	432	232	64	82	26	44	300
31	36	---	28	33	---	445	---	64	---	41	66	---
TOTAL	982	1185	1060	929	900	6813	13363	3803	2804	2552	1414	5881
MEAN	31.7	39.5	34.2	30.0	32.1	213	445	123	93.5	82.3	45.6	196
MAX	39	46	40	33	37	450	724	215	189	249	70	389
MIN	24	31	28	27	30	36	216	64	39	25	30	94
+	3.0	4.1	4.3	4.6	3.9	5.9	5.1	5.7	5.3	3.5	3.9	5.5
MEAN‡	34.7	43.6	38.5	34.6	36.0	219	451	129	98.8	85.8	49.5	202
CFSM‡	.15	.18	.16	.15	.15	.92	1.90	.54	.42	.36	.21	.85
IN‡	.17	.21	.19	.17	.16	1.07	2.12	.62	.47	.42	.24	.95

CAL YR 1976 TOTAL 72239 MEAN 197 MAX 1370 MIN 21 MEAN‡ 202 CFSM‡ .85 IN‡ 11.61
WTR YR 1977 TOTAL 41486 MEAN 114 MAX 724 MIN 24 MEAN‡ 118 CFSM‡ .50 IN‡ 6.77

+Average monthly diversion, equivalent in cubic feet per second, for industrial use; furnished by Hanna Mining Co.
‡Adjusted for diversion.

04065500 STURGEON RIVER NEAR FOSTER CITY, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: July 1956 to current year.

INSTRUMENTATION.--Temperature recorder since July 26, 1956.

REMARKS.--Complete ice cover during winter period. Temperature recorder clock stopped Nov. 7-30 (range in temperature 0.0 to 2.0°C), Apr. 5 to June 8 (range in temperature 0.0 to 24.5°C).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 30.0°C July 1, 1963, minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 30.0°C July 19; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	14.0	10.5	4.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	14.5	12.0	5.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	14.0	11.5	4.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	14.5	12.5	3.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	14.5	13.0	3.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	13.5	11.0	2.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	10.5	10.5	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	10.0	8.0	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	10.0	8.5	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	10.0	9.0	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	10.0	7.5	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	11.5	9.0	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	11.0	9.5	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	9.5	8.0	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	9.0	7.5	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	7.5	6.0	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	6.5	5.0	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	5.5	4.0	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	6.0	4.5	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	5.5	4.0	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	5.5	4.5	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	5.0	3.5	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	4.5	3.0	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	4.5	3.0	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	4.0	3.5	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	3.5	2.5	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
27	3.5	2.0	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	4.0	2.0	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	5.5	3.5	---	---	0.0	0.0	0.0	0.0	---	---	0.0	0.0
30	5.0	4.0	---	---	0.0	0.0	0.0	0.0	---	---	0.5	0.0
31	5.0	3.5	---	---	0.0	0.0	0.0	0.0	---	---	2.0	0.5
MONTH	14.5	2.0	5.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0

04065500 STURGEON RIVER NEAR FOSTER CITY, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	1.5	1.0			---	---	21.0	18.5	23.0	20.5	22.0	20.5
2	1.0	0.5			---	---	21.5	16.5	23.0	20.0	21.0	19.5
3	1.5	0.5			---	---	21.5	19.0	23.0	20.5	20.0	17.5
4	1.5	0.0			---	---	23.5	20.5	22.5	20.5	19.5	18.0
5	---	---			---	---	24.5	21.5	22.5	20.5	19.0	18.0
6	---	---			---	---	24.5	23.0	23.5	20.5	18.5	17.0
7	---	---			---	---	25.5	23.0	25.5	22.0	17.5	16.5
8	---	---			---	---	25.5	23.5	25.5	23.0	19.0	17.0
9	---	---			19.0	16.5	25.0	22.0	24.5	21.0	19.0	18.0
10	---	---			18.5	15.0	23.0	20.0	22.5	20.5	18.5	17.0
11	---	---			17.0	15.0	23.0	20.5	22.0	19.5	17.5	15.5
12	---	---			19.0	15.0	24.0	21.5	22.5	17.5	16.0	15.5
13	---	---			19.0	15.5	26.0	21.0	23.0	19.0	17.5	15.5
14	---	---			19.5	16.0	27.5	22.5	21.5	18.5	17.5	15.0
15	---	---			21.0	17.0	28.0	24.0	21.0	18.5	17.0	15.5
16	---	---			21.0	18.5	27.5	24.0	20.0	19.0	16.0	16.0
17	---	---			21.5	17.5	27.5	24.0	19.5	17.0	16.5	16.0
18	---	---			21.5	20.0	27.5	24.5	19.0	16.0	16.5	16.0
19	---	---			22.0	19.5	30.0	25.0	20.0	16.5	16.5	16.0
20	---	---			23.0	19.5	29.5	26.5	19.0	17.0	16.0	14.5
21	---	---			23.0	18.5	28.5	25.5	21.0	17.5	14.5	12.5
22	---	---			23.0	19.0	27.5	23.0	19.5	17.0	---	---
23	---	---			22.5	19.5	27.0	23.0	19.0	16.0	---	---
24	---	---			22.0	19.5	28.0	24.5	20.0	15.5	---	---
25	---	---			23.5	19.5	27.0	23.5	20.0	16.0	---	---
26	---	---			25.0	20.5	25.0	21.0	20.0	18.0	---	---
27	---	---			25.0	22.5	24.5	21.0	23.0	20.0	---	---
28	---	---			24.5	22.0	23.5	22.0	23.0	22.0	---	---
29	---	---			24.0	20.5	24.5	21.0	23.0	20.0	---	---
30	---	---			23.5	21.0	24.0	21.0	23.0	19.5	---	---
31	---	---			---	---	24.0	21.5	22.5	20.5	---	---
MONTH	1.5	0.0			25.0	15.0	30.0	16.5	25.5	15.5	22.0	12.5

04065600 PINE CREEK NEAR IRON MOUNTAIN, MI

LOCATION.--Lat 45°55'51", long 87°58'18", in SE¼ SE¼ sec.19, T.41 N., R.29 W., Dickinson County, Hydrologic Unit 04030108, on left bank 20 ft (6 m) upstream from bridge on County Road 866, 1.2 mi (1.9 km) downstream from Steel Creek, and 9.0 mi (14.5 km) northeast of Iron Mountain.

DRAINAGE AREA.--16.8 mi² (43.5 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water year 1971. October 1971 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,034 ft (315.16 m) above mean sea level, from topographic leveling (nearest 0.5 ft). Prior to Nov. 23, 1971, nonrecording gage 20 ft (6 m) downstream at same datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Flow includes an average of 4.6 ft³/s (0.13 m³/s) diverted from West Branch Sturgeon River Basin. Regulation and storage by reservoirs in the headwaters.

AVERAGE DISCHARGE.--5 years (water years 1972-76), 14.5 ft³/s (0.411 m³/s), 11.72 in/yr (298 mm/yr), adjusted for storage and diversion.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 272 ft³/s (7.70 m³/s) May 16, 1976, gage height, 6.42 ft (1.957 m); minimum, 0.70 ft³/s (0.020 m³/s) Aug. 11, 12, 1975; minimum gage height, 1.46 ft (0.445 m) Aug. 11, 12, 1975, and July 27, 28, Aug. 15, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 156 ft³/s (4.42 m³/s) Mar. 13, gage height, 5.15 ft (1.570 m); minimum, 0.90 ft³/s (0.025 m³/s) Aug. 23; minimum gage height, 1.46 ft (0.445 m) July 27, 28, Aug. 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.2	3.1	1.3	1.2	1.6	3.0	50	3.7	6.0	4.8	3.6	10
2	2.1	3.2	1.3	1.2	1.6	3.0	34	3.5	5.7	4.1	4.0	6.8
3	2.1	3.2	1.3	1.3	1.7	3.0	37	3.1	3.6	5.6	2.5	4.2
4	2.0	2.6	1.3	1.3	1.8	3.0	12	3.9	3.7	6.3	2.7	5.8
5	2.6	2.4	1.3	1.3	1.8	3.0	9.6	4.3	4.3	8.9	2.1	6.4
6	2.7	2.3	1.3	1.3	1.9	3.0	6.7	5.1	3.7	6.9	2.0	8.2
7	2.6	2.2	1.4	1.3	1.9	3.0	4.9	3.4	3.4	6.2	1.8	9.9
8	2.4	1.9	1.4	1.3	2.0	3.1	3.5	3.1	3.3	5.1	1.6	7.7
9	2.4	2.0	1.5	1.3	2.1	3.2	4.2	2.6	2.9	3.8	1.2	5.4
10	2.2	2.1	1.5	1.2	2.1	6.0	9.0	2.5	2.3	3.3	1.5	4.8
11	2.2	2.1	1.5	1.2	2.2	30	19	2.4	2.1	3.3	1.4	3.9
12	2.2	2.2	1.6	1.2	2.3	124	20	2.4	2.2	2.8	1.1	5.7
13	2.2	2.2	1.6	1.2	2.3	152	33	2.5	2.2	2.6	1.2	5.6
14	2.2	2.2	1.6	1.2	2.4	138	34	2.4	2.2	2.1	1.3	4.1
15	2.1	2.3	1.6	1.2	2.4	131	25	2.3	2.5	1.9	1.1	3.5
16	2.1	2.3	1.6	1.2	2.5	118	23	2.3	3.0	1.9	4.2	4.8
17	2.0	2.4	1.6	1.2	2.5	99	19	2.2	3.4	1.6	3.9	7.2
18	1.8	2.4	1.6	1.3	2.6	80	17	2.1	3.5	1.5	2.0	6.0
19	1.7	2.5	1.5	1.3	2.7	65	16	2.3	3.1	1.4	1.6	25
20	1.7	2.6	1.5	1.3	2.8	55	16	2.4	3.2	1.4	1.3	24
21	1.6	2.6	1.5	1.4	2.8	45	19	3.0	3.0	1.2	1.2	18
22	2.0	2.6	1.4	1.4	2.9	35	22	3.3	2.8	1.4	1.1	17
23	2.0	2.7	1.4	1.4	2.9	30	17	3.1	2.9	1.1	.92	17
24	2.1	2.8	1.3	1.4	2.9	25	13	2.5	2.9	1.4	.94	27
25	2.1	2.7	1.3	1.4	3.0	20	9.1	2.0	2.8	2.1	.94	39
26	2.2	2.6	1.3	1.5	3.0	21	6.8	1.9	2.6	1.3	1.4	36
27	2.4	2.2	1.2	1.5	3.0	61	6.1	1.9	2.7	1.2	2.6	28
28	2.7	1.7	1.2	1.5	3.0	83	5.4	1.8	4.7	1.1	2.9	22
29	2.8	1.5	1.2	1.5	---	109	4.7	1.8	3.6	1.5	2.0	19
30	2.8	1.4	1.2	1.6	---	102	4.1	1.6	4.0	1.2	2.0	17
31	2.8	---	1.2	1.6	---	78	---	2.4	---	3.8	8.2	---
TOTAL	69.0	71.0	43.5	41.2	66.7	1634.3	500.1	83.8	98.3	92.8	66.30	399.0
MEAN	2.23	2.37	1.40	1.33	2.38	52.7	16.7	2.70	3.28	2.99	2.14	13.3
MAX	2.8	3.2	1.6	1.6	3.0	152	50	5.1	6.0	8.9	8.2	39
MIN	1.6	1.4	1.2	1.2	1.6	3.0	3.5	1.6	2.1	1.1	.92	3.5

CAL YR 1976 TOTAL 6325.50 MEAN 17.3 MAX 196 MIN 1.2
WTR YR 1977 TOTAL 3166.00 MEAN 8.67 MAX 152 MIN .92

04065600 PINE CREEK NEAR IRON MOUNTAIN, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water year 1972 to current year.

PERIOD OF DAILY RECORD.--November 1971 to current year.

INSTRUMENTATION.--Temperature recorder since Nov. 10, 1971.

REMARKS.--Complete ice cover during winter period. Temperature recorder clock stopped July 30 to Aug. 8 (range in temperature 15.5 to 21.5°C), Sept. 3-19 (range in temperature 12.0 to 17.5°C).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 28.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 28.0°C July 19; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	10.5	8.0	3.5	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	11.0	9.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	10.0	8.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	11.0	9.0	3.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	11.0	10.0	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	10.0	7.5	2.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	7.5	7.5	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	7.5	7.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	7.0	7.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	7.0	7.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	7.0	7.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	8.0	7.0	2.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	8.0	6.5	2.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	7.0	6.5	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
15	6.5	6.5	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
16	6.5	6.5	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
17	6.5	6.0	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
18	6.0	6.0	1.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
19	6.0	5.5	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
20	5.5	5.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
21	5.5	5.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
22	5.0	4.5	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
23	4.5	4.5	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5
24	4.5	4.5	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0
25	4.5	4.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0
26	4.0	4.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0
27	4.0	3.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0
28	4.0	3.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0
29	3.5	3.5	0.5	0.5	0.0	0.0	0.0	0.0	---	---	1.0	1.0
30	3.5	3.5	0.5	0.0	0.0	0.0	0.0	0.0	---	---	1.0	1.0
31	3.5	3.0	---	---	0.0	0.0	0.0	0.0	---	---	1.0	1.0
MONTH	11.0	3.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0

04065600 PINE CREEK NEAR IRON MOUNTAIN, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	1.5	1.0	13.5	11.5	14.5	13.5	18.5	17.5	---	---	18.0	17.5
2	1.5	1.5	12.5	9.5	14.0	12.0	18.5	14.5	---	---	17.5	16.5
3	1.5	1.5	12.5	9.5	15.5	11.5	19.5	17.0	---	---	---	---
4	1.5	1.5	11.5	10.5	18.0	15.0	21.0	19.0	---	---	---	---
5	1.5	1.5	14.5	11.5	18.0	16.0	22.0	20.0	---	---	---	---
6	1.5	1.5	14.0	11.5	17.0	15.0	23.0	22.0	---	---	---	---
7	1.5	1.5	13.0	9.5	16.0	13.0	23.5	22.0	---	---	---	---
8	1.5	1.5	13.0	10.0	14.0	14.0	23.5	21.5	---	---	---	---
9	2.0	1.5	13.0	9.0	15.0	13.0	22.5	18.0	19.0	17.0	---	---
10	3.5	2.0	14.0	9.5	15.0	12.5	19.5	16.0	20.5	18.5	---	---
11	4.0	3.5	16.5	11.5	14.0	13.0	20.0	17.5	20.0	17.5	---	---
12	4.5	4.0	19.0	13.5	16.5	14.0	20.5	19.5	19.5	14.0	---	---
13	4.5	4.0	18.0	15.5	16.5	12.5	22.0	18.0	19.5	18.0	---	---
14	5.5	4.0	18.5	14.0	16.5	13.5	25.0	20.0	18.0	14.5	---	---
15	5.5	5.5	18.0	13.0	18.0	14.5	24.0	20.5	17.0	14.0	---	---
16	7.5	5.5	19.5	14.5	18.0	16.0	23.0	20.0	17.0	16.5	---	---
17	7.5	7.0	19.5	15.5	19.5	16.0	22.5	20.0	16.5	14.5	---	---
18	8.0	7.5	21.0	16.0	19.5	19.0	24.5	20.0	15.5	12.5	---	---
19	9.0	8.0	21.0	16.5	19.5	18.0	28.0	22.0	16.5	13.5	---	---
20	9.5	9.0	20.5	16.5	19.5	18.0	26.0	23.5	15.5	14.5	12.0	12.0
21	9.5	8.5	18.5	16.5	19.5	15.0	25.5	20.0	18.0	15.5	12.0	12.0
22	8.5	7.0	19.5	16.5	19.5	15.0	23.5	15.5	16.5	13.0	12.0	12.0
23	9.0	7.5	20.0	16.5	19.0	16.5	24.5	16.0	16.0	12.5	12.0	12.0
24	9.0	8.0	21.0	16.0	19.0	18.0	24.5	20.0	16.5	11.5	12.0	12.0
25	9.0	7.5	21.5	16.0	20.0	17.0	22.5	18.0	17.0	11.0	12.0	12.0
26	10.0	7.5	21.5	16.0	21.0	16.5	22.0	13.5	17.0	14.0	12.0	12.0
27	10.5	9.0	21.0	15.0	21.0	20.0	20.0	14.0	19.0	17.0	12.0	12.0
28	9.5	7.5	21.0	15.0	21.5	20.0	18.0	16.5	19.0	18.5	12.0	12.0
29	11.0	8.0	19.5	15.0	21.0	18.5	22.0	17.0	18.5	16.0	12.5	12.0
30	14.0	10.5	19.5	14.0	20.5	18.0	---	---	18.0	15.0	12.5	12.0
31	---	---	18.0	14.5	---	---	---	---	17.5	17.0	---	---
MONTH	14.0	1.0	21.5	9.0	21.5	11.5	28.0	13.5	20.5	11.0	18.0	12.0

04066000 MENOMINEE RIVER NEAR PEMBINE, WI

LOCATION.--Lat 45°35'56", long 87°46'32", in sec.16, T.37 N., R.28 W., Michigan Meridian, Menominee County, MI, Hydrologic Unit 04030108, on left bank 0.6 mi (1.0 km) upstream from Pemene Creek, 4.0 mi (6.4 km) west of Nathan, MI, 15 mi (24 km) southeast of Pembine, and at mile 65.8 (105.9 km).

DRAINAGE AREA.--3,240 mi² (8,390 km²), approximately.

PERIOD OF RECORD.--October 1949 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1277: 1952.

GAGE.--Water-stage recorder. Altitutde of gage is 770 ft (235 m), from river-profile map. Prior to Oct. 28, 1972, at site 0.5 mi (0.8 km) downstream at datum 15 ft (4.6 m) lower.

REMARKS.--Records good except those for winter months and period of no gage-height record, July 27 to Sept. 11, which are fair. Flow regulated by powerplants and by Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm³), and Peavy Pond, capacity, 33,860 acre-ft (41.7 hm³), on the Michigamme River, and by many smaller reservoirs above station.

AVERAGE DISCHARGE.--28 years, 2,960 ft³/s (83.83 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 26,900 ft³/s (762 m³/s) May 8, 1960, gage height, 13.90 ft (4.237 m); minimum, 694 ft³/s (19.7 m³/s) Sept. 3, 1969, gage height, 1.66 ft (0.506 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 7,720 ft³/s (219 m³/s) Apr. 22, gage height, 11.36 ft (3.463 m); minimum daily, 840 ft³/s (23.8 m³/s) Aug. 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	984	1020	1100	1100	1200	1600	3340	3870	1940	1580	900	2200
2	1020	1060	1200	960	1300	1500	2990	3990	2220	1530	1100	2500
3	1000	1150	1200	1200	1300	1400	2820	3560	2240	1290	940	2900
4	998	1130	1200	1300	1200	1600	2770	3340	1850	1410	1030	3000
5	1140	1100	1200	1200	1300	1400	2710	3120	1830	1540	1000	2800
6	1120	1050	1100	1200	980	1400	2780	2780	1900	1620	940	2700
7	1010	1020	1100	1200	1000	1600	2430	2350	2040	2010	880	2900
8	1130	1030	1200	1100	1100	2000	2600	2360	2100	1990	920	2800
9	1030	1070	1200	1000	1100	1900	3000	2300	1910	1700	920	2600
10	1020	1100	1200	1000	1000	2400	2700	2190	2030	1430	920	1600
11	1020	1050	1200	1300	1100	2500	3000	2090	1840	1360	900	1100
12	1010	1070	1200	1200	1200	2900	3300	1880	1550	1500	1000	1470
13	971	1210	1400	1300	1200	3500	3900	1900	1520	1440	900	1690
14	967	1080	1400	1200	1100	3600	4200	1700	1600	1300	840	2010
15	977	988	1300	1200	1100	3500	5000	1450	1610	1320	1100	2020
16	1050	1020	1200	1000	1200	3400	4900	1570	1620	1240	1000	2020
17	1020	1100	1100	1100	1200	3300	4800	1710	1640	1170	900	1810
18	1010	1100	1000	1100	1300	3500	5200	1840	1490	1090	940	1800
19	1030	1100	980	1100	1100	3700	5000	1960	1360	1300	940	2320
20	1120	1000	1100	1000	1000	3200	5200	2100	1420	1210	920	3300
21	1080	1030	1300	1100	1100	3120	6740	2020	1460	1180	1100	3380
22	1030	1030	1200	1000	1200	2170	7270	1830	1450	1270	1000	3410
23	1040	1070	1200	920	1400	2160	6980	1850	1460	1170	1100	3440
24	1020	1050	1100	940	1500	2150	6590	2470	1540	1110	1000	3590
25	1010	1000	1000	960	1300	2110	6180	2380	1380	1080	1000	3900
26	1000	940	1000	1000	1400	1990	5950	2140	1190	1060	1000	4170
27	999	920	1000	940	1500	1910	4650	1850	1250	940	1200	4580
28	994	900	1100	1100	1300	1790	4360	1770	1520	1100	1100	4240
29	990	900	1200	1000	---	3080	4210	1520	1690	940	1100	4210
30	1040	1000	1300	860	---	3460	4060	1400	1620	1000	1000	4120
31	1040	---	1200	900	---	3440	---	1520	---	900	1500	---
TOTAL	31870	31288	36180	33480	33680	77280	129630	68810	50270	40780	31090	84580
MEAN	1028	1043	1167	1080	1203	2493	4321	2220	1676	1315	1003	2819
MAX	1140	1210	1400	1300	1500	3700	7270	3990	2240	2010	1500	4580
MIN	967	900	980	860	980	1400	2430	1400	1190	900	840	1100

CAL YR 1976 TOTAL 971056 MEAN 2653 MAX 15500 MIN 884
WTR YR 1977 TOTAL 648938 MEAN 1778 MAX 7270 MIN 840

04067000 MENOMINEE RIVER BELOW KOSS, MI

LOCATION.--Lat 45°21'16", long 87°38'55", in sec.9, T.34 N., R.27 W., Michigan Meridian, Menominee County, Hydrologic Unit 04030108, on left bank at powerplant of Wisconsin Public Service Corp., 0.5 mi (0.8 km) upstream from Little Cedar River, 3.6 mi (5.8 km) southeast of Koss, and at mile 24.7 (39.7 km).

DRAINAGE AREA.--3,790 mi² (9,820 km²), approximately.

PERIOD OF RECORD.--July 1907 to March 1909 (published as "at Koss"), July 1913 to current year.

GAGE.--Headwater and tailwater gages and generation data entered hourly in daily log sheet by company employees. Prior to June 1913, chain gage on railroad bridge 4 mi (6.4 km) upstream.

REMARKS.--Records fair. Daily discharge computed on basis of average daily load and load-discharge rating of combined hydroelectric units. Flow regulated by powerplants, and by Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm³), and Peavy Pond, capacity, 33,860 acre-ft (41.7 hm³) on Michigamme River, and by many smaller reservoirs above station.

COOPERATION.--Records of daily discharge furnished by Wisconsin Public Service Corp. since 1913.

AVERAGE DISCHARGE.--65 years (water years 1907-08, 1913-77), 3,134 ft³/s (88.76 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 33,000 ft³/s (935 m³/s) May 10, 1960; minimum daily, 162 ft³/s (4.59 m³/s) Sept. 15, 1931.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 7,870 ft³/s (223 m³/s) Apr. 23; minimum daily, 778 ft³/s (22.0 m³/s) Nov. 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1090	1150	944	1340	1060	1340	4200	3720	2010	1710	1110	1800
2	1060	1260	1150	1220	1270	1520	3810	3480	1970	1490	1110	2930
3	1030	1260	1270	1060	1450	1710	3810	3350	2200	1660	1040	2830
4	912	1200	1320	1160	1420	1530	3730	3320	2220	1520	1500	2550
5	1060	1300	1340	1460	1330	1460	3800	2880	1940	1380	1510	2640
6	1100	1150	1250	1460	1270	1570	3750	2760	1720	2060	1350	2660
7	1240	1060	1100	1340	1310	1420	3780	2720	1930	1950	906	2600
8	1080	1080	1090	1260	1050	1560	3600	2330	1870	2490	1030	2840
9	936	1100	1250	1270	1320	1890	3370	2280	2040	2200	1350	2780
10	999	1180	1280	979	1340	1620	3350	2200	1780	1910	1230	2700
11	1120	1360	1220	1100	1340	1900	3370	2060	1710	1440	1170	1960
12	1320	1060	1180	1220	1380	2510	4020	2180	1620	1620	980	1640
13	1270	1300	1290	1340	1420	2800	4030	1860	1840	1540	980	1820
14	1080	1340	1160	1280	1500	3260	4390	1770	1620	1660	980	1820
15	1180	1390	1520	1360	1210	3530	4350	1550	1500	1360	1170	1820
16	1180	1280	1590	1100	1320	3280	5140	1630	1680	1360	1220	2240
17	1100	1100	1340	1260	1300	3440	4940	2010	1730	1060	1080	2020
18	1330	1200	1320	1010	1340	3720	4870	1830	1630	1200	1090	1840
19	1100	1250	1100	1140	1400	3300	5340	1800	1420	1340	1170	2680
20	1220	1320	1130	1100	1340	3180	5390	1980	1510	1240	1060	3130
21	1250	1200	1200	1080	1180	3120	6940	1980	1530	1200	1220	3600
22	1300	1100	1340	1110	1200	3020	7340	1960	1580	1380	1170	3380
23	1100	950	1410	1190	1470	2470	7870	1830	1560	1250	1200	3380
24	1180	1060	1340	1190	1700	3020	7300	2110	1480	1110	1150	3440
25	1100	1300	1320	1140	1860	2770	7010	2250	1710	1110	1090	3590
26	1100	1240	864	1080	1660	2700	5850	2390	1320	1390	1080	4560
27	1010	1340	912	1150	1610	2480	5230	2080	1250	1300	1390	5470
28	1200	778	1120	1270	1660	2870	4160	1660	1470	1200	1170	5470
29	1120	912	1060	1220	---	4780	3860	1750	1670	1260	1230	3910
30	1080	880	912	1400	---	5820	3710	1690	1740	1180	1190	3500
31	1200	---	1140	960	---	5690	---	1410	---	1110	2020	---
TOTAL	35047	35100	37462	37249	38710	85280	142810	68820	51250	45680	36946	87600
MEAN	1131	1170	1208	1202	1383	2751	4760	2220	1708	1474	1192	2920
MAX	1330	1390	1590	1460	1860	5820	7870	3720	2220	2490	2020	5470
MIN	912	778	864	960	1050	1340	3350	1410	1250	1060	906	1640

CAL YR 1976 TOTAL 1035749 MEAN 2830 MAX 15800 MIN 711
WTR YR 1977 TOTAL 701954 MEAN 1923 MAX 7870 MIN 778

04096207 BAW BEESE LAKE OUTLET AT HILLSDALE, MI

LOCATION.--Lat 41°54'18", long 84°37'01", in NE¼ SE¼ sec.35, T.6 S., R.3 W., Hillsdale County, Hydrologic Unit 04050001, at bridge on Lakeview Road, 300 ft (91 m) downstream from Baw Beese Lake, 0.5 mi (0.8 km) southeast of Hillsdale.

DRAINAGE AREA.--5.10 mi² (13.21 km²).

PERIOD OF RECORD.--Water years 1974 to May 1977 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)
DEC 21...	1530	E.01	385	7.9	2.0	7	12.7	180	29	43	18

DATE	DISSOLVED SODIUM (NA) (MG/L)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
DEC 21...	9.6	10	.3	1.7	186	0	153	3.7	18	20	.1

DATE	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	DISSOLVED SOLIDS (TONS PER DAY)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)
DEC 21...	2.9	220	205	.30	.03	.08	.01	.03	1	0	<10

DATE	TOTAL COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)	CYANIDE (CN) (MG/L)
DEC 21...	0	0	0	2	10	<.5	2	0	0	10	.00

E--ESTIMATED VALUE

04096207 HAW REESE LAKE OUTLET AT HILLSDALE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITRITE (NO2) (MG/L)
OCT												
15...	1100	E.10	365	7.6	12.5	--	.00	.00	.00	.01	.01	.03
NOV												
23...	1100	E.10	345	7.9	2.5	--	.05	.07	.30	.01	.01	.03
JAN												
05...	1435	.10	375	8.0	2.0	--	.05	.05	.22	.01	.02	.07
FEB												
25...	1310	E3.0	335	--	3.5	13.0	.14	.14	.62	.01	.01	.03
MAR												
15...	1445	15	305	8.0	7.0	12.2	.09	.08	.35	.01	.03	.10

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)	TOTAL NITROGEN (NO3) (MG/L)
OCT												
15...	.01	.01	.03	.02	.03	.95	.53	.98	.55	.99	.56	4.4
NOV												
23...	.06	.08	.07	.06	.08	.51	.47	.58	.53	.64	.61	2.8
JAN												
05...	.06	.07	.15	.06	.08	.68	.42	.83	.48	.89	.55	3.9
FEB												
25...	.15	.15	.12	.10	.13	.45	.42	.57	.52	.72	.67	3.2
MAR												
15...	.10	.11	.09	.06	.08	.43	.36	.52	.42	.62	.53	2.7

DATE	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL HYDROLYZABLE PHOSPHORUS (P) (MG/L)	DIS. HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DIS. ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
OCT											
15...	.03	.03	.01	.01	.01	--	--	.02	.04	.00	.00
NOV											
23...	.03	.03	.00	.01	.03	.03	.03	.03	.04	.00	.00
JAN											
05...	.06	.02	.01	.01	.03	--	--	--	--	--	--
FEB											
25...	.03	--	.02	.02	.06	--	.01	--	.03	--	--
MAR											
15...	.02	.01	.01	.01	.03	.02	.01	.03	.02	--	--

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)	DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
OCT					FEB				
15...	1100	E.10	2	E.00	25...	1310	E3.0	4	E.03
NOV					MAR				
23...	1100	E.10	10	E.00	15...	1445	15	2	.08

E--ESTIMATED VALUE

04096214 KING LAKE OUTLET AT HILLSDALE, MI

LOCATION.--Lat 41°54'26", long 84°37'28", in NE¼ NW¼ sec.35, T.6 S., R.3 W., Hillsdale County, Hydrologic Unit 04050001, at bridge on Steamburg Road at Hillsdale, 0.3 mi (0.5 km) upstream from mouth.

DRAINAGE AREA.--4.19 mi² (10.85 km²).

PERIOD OF RECORD.--Water years 1974 to May 1977 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA+MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)
DEC 22...	1200	604	7.8	1.0	20	13.5	310	50	83	25	7.3

DATE	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
DEC 22...	5	.2	2.1	317	0	260	8.0	47	16	.1

DATE	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)
DEC 22...	8.1	361	353	.49	.01	.03	1	0	<10	0

DATE	TOTAL COPPER (CU) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)	CYANIDE (CN) (MG/L)
DEC 22...	10	30	2	50	<.5	1	0	0	10	.00

04096214 KING LAKE OUTLET AT HILLSDALE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITRITE (NO2) (MG/L)
NOV												
23...	0930	.56	465	7.9	1.0	--	2.1	2.0	8.7	.01	.03	.10
DEC												
22...	1200	--	604	7.8	1.0	13.5	--	--	--	--	--	--
FEB												
25...	1215	E4.0	385	--	1.5	12.6	1.6	1.6	6.9	.04	.05	.16
MAR												
05...	0935	E12	455	7.4	1.0	--	1.3	1.3	5.6	.03	.03	.10
30...	1405	E12	420	7.7	12.5	9.1	1.1	1.1	4.8	.02	.01	.03

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)	TOTAL NITROGEN (NO3) (MG/L)
NOV												
23...	2.1	2.0	.02	.03	.04	--	.45	--	.48	--	2.5	--
DEC												
22...	1.7	--	--	--	--	--	--	--	--	--	2.8	--
FEB												
25...	1.6	1.6	.21	.19	.24	--	1.0	--	1.2	--	2.8	--
MAR												
05...	1.3	1.3	.11	.09	.12	.80	.91	.91	1.0	2.2	2.3	9.8
30...	1.1	1.1	.04	.00	.00	.76	.80	.80	.80	1.9	1.9	8.4

DATE	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL HYDROLYZABLE PHOSPHORUS (P) (MG/L)	DISSOLVED HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
NOV											
23...	.02	.03	.01	.01	.03	.02	.02	.03	.03	.00	.00
DEC											
22...	--	--	--	.01	.03	--	--	--	--	--	--
FEB											
25...	.07	.05	.04	.03	.09	--	.04	--	.07	--	--
MAR											
05...	.08	.05	.03	.01	.03	.02	.02	.05	.03	.03	.02
30...	.06	.06	.01	.01	.03	--	--	--	--	--	--

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
NOV					
23...	0930	.56	1.0	32	.05
FEB					
25...	1215	E4.0	1.5	7	E.08
MAR					
05...	0935	E12	1.0	5	E.16
30...	1405	E12	12.5	1	E.03

E--ESTIMATED VALUE

04096225 ST. JOSEPH RIVER AT HILLSDALE, MI

LOCATION.--Lat 41°55'45", long 84°38'22", in SW¼ SE¼ sec.22, T.6 S., R.3 W., Hillsdale County, Hydrologic Unit 04050001, at bridge on Fayette Street at Hillsdale.

DRAINAGE AREA.--12.4 mi² (32.1 km²).

PERIOD OF RECORD.--Water years 1974 to May 1977 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)
DEC 23...	1015	813	7.3	1.0	13	13.9	320	61	85	27	42

DATE	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)	DISSOLVED SILICA (SIO2) (MG/L)
DEC 23...	22	1.0	2.8	320	0	262	26	46	85	.2	8.5

DATE	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)
DEC 23...	474	459	.64	.91	.09	.28	1	0	<10	0

DATE	TOTAL COPPER (CU) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)	CYANIDE (CN) (MG/L)
DEC 23...	10	60	4	140	<.5	4	0	2	20	.00

04096225 ST. JOSEPH RIVER AT HILLSDALE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITRITE (NO2) (MG/L)
NOV												
17...	1010	2.5	410	7.6	4.0	--	.60	--	--	.06	--	--
JAN												
05...	1250	2.3	790	7.5	2.0	12.5	.56	.55	2.4	.03	.03	.10
FEB												
11...	1040	5.8	1090	--	3.5	--	.50	.49	2.2	.03	.04	.13
24...	1620	32	360	7.6	1.5	10.0	1.1	1.1	4.6	.04	.05	.16
MAR												
04...	1715	60	265	7.3	2.5	--	.76	.76	3.4	.04	.03	.10
31...	1015	25	450	7.8	9.0	10.8	.74	.73	3.2	.04	.05	.16
APR												
18...	0945	13	475	8.0	15.5	10.7	.32	--	--	.01	--	--

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)	TOTAL NITROGEN (NO3) (MG/L)
NOV												
17...	.66	--	.60	--	--	.23	--	.83	--	1.5	--	6.6
JAN												
05...	.59	.58	2.7	2.5	3.2	1.3	1.0	4.0	3.5	4.6	4.1	20
FEB												
11...	.53	.53	1.1	.98	1.3	.80	.92	1.9	1.9	2.4	2.4	11
24...	1.1	1.1	.52	.38	.49	1.8	1.6	2.3	2.0	3.4	3.1	15
MAR												
04...	.80	.79	.30	.29	.37	1.4	1.1	1.7	1.4	2.5	2.2	11
31...	.78	.78	.09	.04	.05	--	1.1	--	1.1	--	1.9	--
APR												
18...	.33	--	.08	--	--	.72	--	.80	--	1.1	--	5.0

DATE	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL HYDROLYZABLE PHOSPHORUS (P) (MG/L)	DIS. HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DIS. ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
NOV											
17..	.24	--	.16	--	--	--	--	.32	--	.00	--
JAN											
05...	.80	.50	.31	.30	.92	--	--	--	--	--	--
FEB											
11...	.31	.18	.15	.15	.46	--	--	--	--	--	--
24...	.29	.14	.09	.07	.21	--	--	--	--	--	--
MAR											
04...	.29	.13	.09	.09	.28	.13	.02	.22	.11	.07	.02
31...	.03	.01	.01	.01	.03	--	--	--	--	--	--
APR											
18...	.03	--	.01	--	--	--	--	--	--	--	--

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
NOV				
17...	1010	2.5	11	.07
JAN				
05...	1250	2.3	9	.06
FEB				
11...	1040	5.8	10	.16
FEB				
24...	1620	32	37	3.2
MAR				
04...	1715	60	90	15
31...	1015	25	4	.27

04096250 BEEBE CREEK NEAR NORTH ADAMS, MI

LOCATION.--Lat 41°56'17", long 84°33'02", NW¼ NW¼ sec.21, T.6 S., R.2 W., Hillsdale County, Hydrologic Unit 04050001, at bridge on State Road, 2.5 mi (4.0 km) southwest of North Adams.

DRAINAGE AREA.--20.2 mi² (52.3 km²).

PERIOD OF RECORD.--Water years 1974 to May 1977 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)
DEC 21...	1315	2.2	590	7.4	.0	20	9.6	300	60	79	25

DATE	DISSOLVED SODIUM (NA) (MG/L)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
DEC 21...	8.0	5	.2	1.7	293	0	240	19	67	26	.3

DATE	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	DISSOLVED SOLIDS (TONS PER DAY)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)
DEC 21...	10	388	364	.53	2.30	.49	.01	.03	2	0	<10

DATE	TOTAL COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)	CYANIDE (CN) (MG/L)
DEC 21...	1	20	30	2	60	<.5	2	0	0	20	.00

04096250 BEEBE CREEK NEAR NORTH ADAMS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITRITE (NO2) (MG/L)
NOV												
04...	1135	2.1	605	7.7	4.0	--	.37	--	--	.03	--	--
DEC												
21...	1315	2.2	590	7.4	.0	9.6	.48	.48	2.1	.01	.01	.03
FEB												
07...	1240	1.7	605	7.1	1.0	11.9	.37	.36	1.6	.01	.01	.03
25...	1420	30	395	7.0	1.5	11.2	4.4	4.5	20	.08	.08	.26
MAR												
05...	1030	140	260	7.1	1.0	--	2.7	2.6	12	.06	.06	.20
30...	1320	80	505	7.4	12.5	8.7	2.6	2.7	12	.04	.05	.16

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)	TOTAL NITROGEN (NO3) (MG/L)
NOV												
04...	.40	--	.05	--	--	.45	--	.50	--	.90	--	4.0
DEC												
21...	.49	.49	.11	.11	.14	.29	.32	.40	.43	.89	.92	3.9
FEB												
07...	.38	.37	.12	.12	.15	.39	.29	.51	.41	.89	.78	3.9
25...	4.5	4.6	.49	.37	.48	2.2	1.6	2.7	2.0	7.2	6.6	32
MAR												
05...	2.8	2.7	.35	.25	.32	1.9	1.9	2.2	2.1	5.0	4.8	22
30...	2.6	2.7	.05	.01	.01	--	1.5	--	1.5	--	4.2	--

DATE	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL HYDROLYZABLE PHOSPHORUS (P) (MG/L)	DIS. HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DIS. ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
NOV											
04...	.04	--	.01	--	--	--	--	.03	--	.00	--
DEC											
21...	.03	.01	.01	.01	.03	.02	.01	.03	.02	.00	.00
FEB											
07...	.03	.02	.00	.01	.03	--	--	--	--	--	--
25...	.23	.14	.13	.13	.40	.04	--	.17	--	.06	--
MAR											
05...	.22	.11	.08	.04	.12	.08	.05	.16	.09	.06	.02
30...	.06	.06	.02	.02	.06	--	--	--	--	--	--

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
NOV				
04...	1135	2.1	28	.16
DEC				
21...	1315	2.2	14	.08
FEB				
07...	1240	1.7	2	.01
MAR				
05...	1030	40	48	18
30...	1320	80	7	1.5

04096255 BEEBE CREEK AT LAKE PLEASANT ROAD NEAR NORTH ADAMS, MI

LOCATION.--Lat 41°57'04", long 84°34'26", SW¼ NW¼ sec.17, T.6 S., R.2 W., Hillsdale County, Hydrologic Unit 04050001, at bridge on Lake Pleasant Road, 2.8 mi (4.5 km) southwest of North Adams.

DRAINAGE AREA.--24.6 mi (63.7 km²).

PERIOD OF RECORD.--Water years 1974 to May 1977 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)
DEC 21...	1430	2.2	560	8.0	3.0	22	12.9	290	50	74	26

DATE	DISSOLVED SODIUM (NA) (MG/L)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
DEC 21...	9.3	6	.2	2.3	295	0	242	4.7	43	25	.3

DATE	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	DISSOLVED SOLIDS (TONS PER DAY)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)
DEC 21...	7.6	348	334	.47	2.07	.10	.01	.03	1	0	<10

DATE	TOTAL COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)	CYANIDE (CN) (MG/L)
DEC 21...	0	10	30	6	50	<.5	1	0	0	10	.00

04096255 BEEBE CREEK AT LAKE PLEASANT ROAD NEAR NORTH ADAMS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITRITE (NO2) (MG/L)
NOV												
04...	1105	2.2	505	8.1	5.0	--	.04	--	--	.01	--	--
DEC												
21...	1430	2.2	560	8.0	3.0	12.9	.09	.09	.40	.01	.01	.03
FEB												
07...	1055	2.1	625	7.4	2.0	13.7	.14	.14	.62	.01	.01	.03
25...	1510	E50	405	--	3.5	11.2	.96	1.1	4.7	.04	.03	.10
MAR												
05...	1115	150	375	7.3	2.0	--	1.7	1.7	7.3	.05	.05	.16
30...	1120	92	445	7.9	11.0	10.2	2.2	2.2	9.6	.05	.03	.10

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)	TOTAL NITROGEN (NO3) (MG/L)
NOV												
04...	.05	--	.09	--	--	.46	--	.55	--	.60	--	2.7
DEC												
21...	.10	.10	.09	.08	.10	.41	.40	.50	.48	.60	.58	2.7
FEB												
07...	.15	.15	.24	.22	.28	.56	.47	.80	.69	.95	.84	4.2
25...	1.0	1.1	.38	.38	.49	1.0	.62	1.4	1.0	2.4	2.1	11
MAR												
05...	1.7	1.7	.34	.28	.36	1.6	.59	1.9	.87	3.6	2.6	16
30...	2.2	2.2	.10	.03	.04	1.7	1.5	1.8	1.5	4.0	3.7	18

DATE	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL HYDROLYZABLE PHOSPHORUS (P) (MG/L)	DIS. HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DIS. ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
NOV											
04...	.04	--	.01	--	--	--	--	.03	--	.00	--
DEC											
21...	.03	.01	.01	.01	.03	.01	.00	.02	.01	.00	.00
FEB											
07...	.03	.03	.00	.01	.03	--	--	--	--	--	--
25...	.08	.03	.03	.03	.09	--	.02	--	.05	--	--
MAR											
05...	.09	.06	.01	.01	.03	.06	.03	.07	.04	.02	.02
30...	.05	.04	.01	.01	.03	--	--	--	--	--	--

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
NOV				
04...	1105	2.2	17	.10
DEC				
21...	1430	2.2	56	.33
FEB				
07...	1055	2.1	1	.01
25...	1420	E50	38	E5.1
FEB				
25...	1510	E50	12	E1.6
MAR				
05...	1115	150	12	4.9
30...	1120	92	6	1.5

E--ESTIMATED VALUE

04096264 TRIBUTARY TO BEEBE CREEK TRIBUTARY NEAR HILLSDALE, MI

LOCATION.--Lat 41°58'02", long 84°35'35", in NW¼ sec.7, T.6 S., R.2 W., Hillsdale County, Hydrologic Unit 04050001, at Milnes Road, 3.5 mi (5.6 km) northeast of Hillsdale.

DRAINAGE AREA.--0.70 mi² (1.81 km²).

PERIOD OF RECORD.--Water years 1974 to May 1977 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)
DEC 17...	1310	.30	614	7.9	5.0	1	14.2	330	46	86	27

DATE	DISSOLVED SODIUM (NA) (MG/L)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
DEC 17...	3.6	2	.1	.9	341	0	280	6.9	41	14	.1

DATE	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	DISSOLVED SOLIDS (TONS PER DAY)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)
DEC 17...	12	302	354	.41	.24	.20	.01	.03	2	0	<10

DATE	TOTAL COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)	CYANIDE (CN) (MG/L)
DEC 17...	0	10	40	1	40	<.5	1	0	0	10	.00

04096264 TRIBUTARY TO BEEBE CREEK TRIBUTARY NEAR HILLSDALE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITHITE (NO2) (MG/L)
DEC												
06...	1450	.28	590	7.5	6.0	--	.22	.21	.93	.01	.01	.03
17...	1310	.30	614	7.9	5.0	14.2	.18	.19	.84	.01	.01	.03
FEB												
24...	1050	6.3	240	7.4	1.5	10.0	3.4	3.4	15	.05	.05	.16
MAR												
16...	1125	.66	565	7.8	7.5	11.5	2.6	2.6	11	.02	.02	.07
APR												
14...	1410	.65	550	8.1	17.0	12.4	.81	.80	3.5	.01	.01	.03

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)	TOTAL NITROGEN (NO3) (MG/L)
DEC												
06...	.23	.22	.10	.07	.09	.15	.18	.25	.25	.48	.47	2.1
17...	.19	.20	.02	.03	.04	.13	.05	.15	.08	.34	.28	1.5
FEB												
24...	3.4	3.4	.28	.22	.28	1.7	1.7	2.0	1.9	5.4	5.3	24
MAR												
16...	2.6	2.6	.03	.03	.04	1.5	.59	1.5	.62	4.1	3.2	18
APR												
14...	.82	.81	.01	.01	.01	.39	.29	.40	.30	1.2	1.1	5.4

DATE	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL HYDROLYZABLE PHOSPHORUS (P) (MG/L)	DIS. HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DIS. ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
DEC											
06...	.02	.02	.01	.01	.03	--	.01	.03	.02	.00	.00
17...	.03	.01	.01	.01	.03	--	--	--	--	--	--
FEB											
24...	.29	.23	.16	.16	.49	--	--	--	--	--	--
MAR											
16...	.03	.02	.01	.01	.03	.03	.02	.04	.03	--	--
APR											
14...	.03	.03	.01	.01	.03	--	--	--	--	--	--

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
DEC				
06...	1450	.28	21	.02
17...	1310	.30	12	.01
FEB				
24...	1050	6.3	10	.17
MAR				
16...	1125	.66	11	.02
APR				
14...	1410	.65	8	.01

04096267 BEEBE CREEK TRIBUTARY NEAR HILLSDALE, MI

LOCATION.--Lat 41°57'49", long 84°35'48", in SE¼ NE¼ sec.12, T.6 S., R.3 W., Hillsdale County, Hydrologic Unit 04050001, at bridge on Ball Road, 150 ft (46 m) upstream from mouth, 3.4 mi (5.5 km) northeast of Hillsdale.

DRAINAGE AREA.--10.8 mi² (28.0 km²).

PERIOD OF RECORD.--Water years 1974 to May 1977 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)
DEC 17...	1200	621	7.8	1.5	5	11.7	310	53	80	26	6.3

DATE	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)	DISSOLVED SILICA (SIO2) (MG/L)
DEC 17...	4	.2	1.1	309	0	253	7.8	41	22	.2	11

DATE	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)
DEC 17...	353	343	.48	.66	.02	.06	1	0	<10	0

DATE	TOTAL COPPER (CU) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)	CYANIDE (CN) (MG/L)
DEC 17...	10	40	3	50	<.5	0	0	0	10	.00

04096267 BEEBE CREEK TRIBUTARY NEAR HILLSDALE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITRITE (NO2) (MG/L)
NOV												
04...	1005	2.4	625	7.9	3.5	--	.44	--	--	.01	--	--
DEC												
06...	1350	2.2	560	7.4	.5	--	.68	.67	3.0	.01	.01	.03
FEB												
24...	1750	32	240	7.1	.0	11.2	--	1.8	7.7	.05	.05	.16
MAR												
30...	0855	34	440	7.4	8.0	6.4	1.2	1.2	5.2	.02	.02	.07

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)
NOV											
04...	.45	--	.05	--	--	.20	--	.25	--	.70	--
DEC											
06...	.69	.68	.11	.09	.12	.24	.26	.35	.35	1.0	1.0
FEB											
24...	--	1.8	.51	.30	.39	--	2.1	--	2.4	--	4.2
MAR											
30...	1.2	1.2	.02	.01	.01	.68	.69	.70	.70	1.9	1.9

DATE	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	DIS. HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DIS. ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
NOV											
04...	3.1	.02	--	.01	--	--	--	.02	--	.00	--
DEC											
06...	4.6	.03	.03	.01	.01	.03	.01	.03	.02	.00	.00
FEB											
24...	--	.22	.16	.14	.10	.31	--	--	--	--	--
MAR											
30...	8.4	.04	.03	.01	.01	.03	--	--	--	--	--

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
NOV				
04...	1005	2.4	27	.17
DEC				
06...	1350	2.2	22	.13
MAR				
30...	0855	34	2	.18

04096272 BEEBE CREEK NEAR HILLSDALE, MI

LOCATION.--Lat 41°57'15", long 84°38'20", in NW¼ NE¼ sec.15, T.6 S., R.3 W., Hillsdale County, Hydrologic Unit 04050001, on right bank 20 ft (6 m) upstream from bridge on Moore Road, 1.0 mi (1.6 km) upstream from mouth, and 1.2 mi (1.9 km) northwest of Hillsdale.

DRAINAGE AREA.--42.4 mi² (109.8 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1974 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,070 ft (326 m) from topographic map (nearest 10 ft).

REMARKS.--Water discharge records good except those for the winter period and those for period of no gage-height record, June 4 to July 12, which are fair. Occasional regulation by Lake Belair about 5.0 mi (8.0 km) upstream from station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 462 ft³/s (13.1 m³/s) Mar. 5, 1976, gage height, 6.91 ft (2.106 m); minimum, 2.9 ft³/s (0.082 m³/s) Sept. 11, 12, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 200 ft³/s (5.66 m³/s) Mar. 5, gage height, 5.60 ft (1.707 m); minimum, 2.9 ft³/s (0.082 m³/s) Sept. 11, 12; minimum gage height, 3.70 ft (1.128 m) July 28, 29, Aug. 1, 2, 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.4	10	8.5	6.2	6.2	33	91	34	6.3	13	3.8	5.8
2	6.2	9.9	8.4	6.2	6.2	28	82	32	6.8	10	3.6	8.0
3	6.1	9.5	8.5	6.2	6.1	26	80	31	6.7	8.5	3.8	7.0
4	6.3	9.1	8.5	6.0	6.0	119	72	31	6.5	8.2	4.3	5.6
5	6.8	9.0	8.5	5.8	6.0	196	72	32	7.0	8.0	4.8	5.3
6	17	9.0	8.4	5.8	6.0	158	69	32	9.5	7.5	5.3	4.7
7	15	8.7	8.4	5.8	6.0	110	63	29	7.5	6.5	5.2	4.2
8	12	8.4	8.4	5.8	6.0	89	56	26	12	6.0	8.0	4.0
9	11	22	8.4	5.8	6.0	83	49	25	19	5.7	7.5	4.1
10	9.8	19	8.2	5.5	6.0	78	45	22	17	6.0	10	3.6
11	9.3	14	7.8	5.5	6.2	71	41	20	15	6.8	11	3.2
12	8.8	11	7.4	5.5	6.4	69	37	19	14	6.5	12	3.5
13	8.7	9.5	7.1	5.5	6.5	75	34	18	13	6.2	8.7	9.9
14	7.9	9.1	6.8	5.5	6.6	72	31	17	12	5.4	7.2	10
15	7.3	8.3	6.8	5.5	6.5	65	29	16	11	5.2	5.7	8.4
16	6.9	7.8	6.6	5.5	6.4	57	26	15	9.5	5.2	5.6	12
17	6.8	7.6	6.4	5.5	6.4	49	26	14	12	5.3	5.3	11
18	6.8	7.6	6.6	5.5	6.6	45	26	17	12	6.1	4.6	15
19	7.3	7.7	6.6	5.5	6.5	43	21	19	10	8.1	4.5	17
20	8.4	8.7	6.6	5.7	6.4	43	17	16	8.5	6.7	4.4	14
21	8.6	18	6.6	5.8	6.2	41	18	14	7.5	6.4	5.5	12
22	8.8	13	6.6	5.6	6.2	43	26	13	7.0	7.4	6.6	11
23	8.8	10	6.6	5.4	16	42	47	12	6.5	6.0	5.3	9.5
24	10	8.6	6.6	5.6	87	41	53	11	6.0	5.0	5.8	14
25	9.9	8.3	6.6	6.0	81	40	50	10	6.5	4.9	4.8	17
26	9.5	14	6.4	6.2	56	41	49	9.5	6.0	4.4	4.4	25
27	9.0	23	6.2	6.6	43	45	45	9.0	5.5	4.2	4.3	29
28	8.6	19	6.2	6.7	38	89	44	8.0	5.0	4.2	4.0	22
29	8.6	13	6.2	6.6	---	143	43	7.0	7.0	4.5	6.2	17
30	8.9	10	6.2	6.5	---	143	38	6.0	8.0	5.3	6.0	14
31	12	---	6.2	6.4	---	115	---	6.2	---	4.3	5.1	---
TOTAL	277.5	342.9	224.2	181.3	458.4	2292	1380	570.7	279.3	197.5	187.3	326.8
MEAN	8.95	11.4	7.23	5.85	16.4	73.9	46.0	18.4	9.31	6.37	6.04	10.9
MAX	17	23	8.9	6.7	87	196	91	34	19	13	12	29
MIN	6.1	7.6	6.2	5.4	6.0	26	17	6.0	5.0	4.2	3.6	3.2
CFSM	.21	.27	.17	.14	.39	1.74	1.09	.43	.22	.15	.14	.26
IN.	.24	.30	.20	.16	.40	2.01	1.21	.50	.25	.17	.16	.29

CAL YR 1976 TOTAL 13603.9 MEAN 37.2 MAX 448 MIN 4.9 CFSM .88 IN 11.94
WTR YR 1977 TOTAL 6717.9 MEAN 18.4 MAX 196 MIN 3.2 CFSM .43 IN 5.89

04096272 BEEBE CREEK NEAR HILLSDALE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1974 to May 1977 (discontinued).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1974 to May 1977.
SUSPENDED SEDIMENT DISCHARGE: October 1974 to May 1977.

REMARKS.--Daily temperature record based on once daily measurements between 1500 and 1800 hours.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SEDIMENT CONCENTRATIONS: Maximum daily mean, 234 mg/L Dec. 15, 1976; minimum daily mean, 1 mg/L on several days during 1975, 1976, Mar. 23, 25, 1977.
SEDIMENT DISCHARGES: Maximum daily, 18 tons (16 tonnes) Feb. 17, 1976; minimum daily, 0.05 ton (0.05 tonne) Nov. 16, 1975.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATIONS: Maximum daily mean, 234 mg/L Dec. 15; minimum daily mean, 1 mg/L Mar. 23, 25.
SEDIMENT DISCHARGES: Maximum daily, 8 tons (7 tonnes) Mar. 4; minimum daily, .11 ton (.10 tonne) Mar. 23, 25.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)
DEC 16...	1505	6.8	590	7.7	.5	17	290	43	79	23	7.3

DATE	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)	DISSOLVED SILICA (SIO2) (MG/L)
DEC 16...	5	.2	1.6	303	0	249	9.7	40	20	.2	9.2

DATE	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	DISSOLVED SOLIDS (TONS PER DAY)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)
DEC 16...	348	333	.47	6.39	.80	.00	.00	1	1	<10

DATE	TOTAL COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)
DEC 16...	0	0	30	6	30	<.5	1	0	0	10

04096272 BEEBE CREEK NEAR HILLSDALE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITRITE (NO2) (MG/L)
OCT												
14...	1245	7.6	575	7.5	12.5	--	.44	.45	2.0	.01	.01	.03
NOV												
04...	0920	8.0	580	7.6	5.0	--	.57	--	--	.01	--	--
DEC												
06...	1100	8.4	500	7.7	1.0	--	.70	.68	3.0	.01	.01	.03
JAN												
19...	1410	5.6	590	--	.5	9.7	.75	.75	3.3	.06	.01	.03
FEB												
11...	0920	17	570	--	1.0	--	.78	.76	3.4	.02	.03	.10
25...	1230	75	410	7.5	.0	--	1.3	1.3	5.6	.04	.04	.13
MAR												
04...	1630	143	435	7.2	1.5	--	1.3	1.3	5.6	.04	.04	.13
15...	1325	68	415	7.6	5.5	11.0	1.5	1.5	6.5	.05	.04	.13
31...	0910	117	450	7.6	8.5	8.9	1.3	1.3	5.7	.02	.01	.03
APR												
26...	1140	50	510	7.8	10.0	9.8	.58	.58	2.6	.02	.02	.07
MAY												
31...	1025	6.9	545	7.7	19.0	7.9	.40	.39	1.7	.01	.01	.03

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)	TOTAL NITROGEN (NO3) (MG/L)
OCT												
14...	.45	.46	.01	.01	.01	.34	.37	.35	.38	.80	.84	3.5
NOV												
04...	.58	--	.01	--	--	.44	--	.45	--	1.0	--	4.6
DEC												
06...	.71	.69	.06	.05	.06	.34	.33	.40	.38	1.1	1.1	4.9
JAN												
19...	.81	.76	.12	.12	.15	.46	.41	.58	.53	1.4	1.3	6.2
FEB												
11...	.80	.79	.15	.15	.19	.58	.37	.73	.52	1.5	1.3	6.8
25...	1.3	1.3	.39	.37	.48	1.4	.83	1.8	1.2	3.1	2.5	14
MAR												
04...	1.3	1.3	.24	.16	.21	1.4	1.4	1.6	1.6	2.9	2.9	13
15...	1.5	1.5	.12	.09	.12	.76	.61	.88	.70	2.4	2.2	11
31...	1.3	1.3	.04	.01	.01	--	1.3	--	1.3	--	2.6	--
APR												
26...	.60	.60	.06	.01	.01	.94	.59	1.0	.60	1.6	1.2	7.1
MAY												
31...	.41	.40	.08	.01	.01	--	.66	--	.67	--	1.1	--

DATE	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL HYDROLYZABLE PHOSPHORUS (P) (MG/L)	DIS. HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DIS. ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
OCT											
14...	.04	.02	.01	.01	.03	--	--	.03	.02	.00	.00
NOV											
04...	.03	--	.01	--	--	--	--	.03	--	.00	--
DEC											
06...	.02	.03	.01	.01	.03	--	.02	.03	.03	.00	.00
JAN											
19...	.02	.02	.00	.01	.03	--	--	--	--	--	--
FEB											
11...	.03	.03	.01	.01	.03	--	--	--	--	--	--
25...	.12	.08	.07	.07	.21	.06	.03	.13	.10	--	--
MAR											
04...	.22	.11	.10	.07	.21	.08	.02	.18	.09	.04	.02
15...	.03	.02	.02	.01	.03	.01	.02	.03	.03	.00	--
31...	.02	.01	.01	.01	.03	--	--	--	--	--	--
APR											
26...	.05	.04	.04	.03	.09	--	--	--	--	--	--
MAY											
31...	.03	.01	.00	.00	.00	--	--	--	--	--	--

04096272 BEEBE CREEK NEAR HILLSDALE, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY
1	16.0	5.0	0.0	---	0.0	1.5	8.0	15.5
2	17.0	---	0.0	0.0	0.0	1.0	---	15.5
3	---	---	0.0	0.0	0.0	1.5	---	---
4	18.0	4.5	0.0	0.0	---	1.0	8.0	14.0
5	---	4.0	---	0.0	0.0	1.0	6.5	---
6	13.5	---	---	0.0	0.0	0.0	5.0	---
7	11.0	3.5	---	0.0	0.0	2.0	7.0	---
8	---	---	---	0.0	0.0	3.5	7.0	---
9	---	2.5	---	0.0	0.0	4.0	7.5	---
10	---	---	---	---	1.0	5.5	12.0	---
11	---	---	---	---	0.0	1.0	6.0	---
12	---	---	---	---	0.0	0.0	6.5	---
13	---	---	---	---	---	0.0	5.0	---
14	13.0	2.0	---	---	0.0	0.0	5.0	16.0
15	---	2.0	0.0	0.5	0.0	0.0	5.0	16.5
16	---	---	---	---	0.5	0.0	5.0	---
17	---	2.0	0.0	0.5	0.0	0.0	---	17.5
18	9.5	3.5	---	0.0	0.0	0.0	4.5	---
19	6.5	---	0.0	0.0	1.0	---	---	---
20	6.5	---	---	0.0	---	3.5	---	---
21	---	---	---	---	0.0	1.0	3.5	---
22	6.0	---	0.0	0.0	0.0	1.0	3.5	---
23	5.0	---	---	---	0.0	1.0	4.0	---
24	---	---	---	---	0.0	0.0	4.0	---
25	7.0	---	---	---	0.0	0.0	5.0	---
26	6.0	---	---	---	---	1.0	6.5	---
27	5.0	---	---	---	0.0	1.0	---	---
28	---	---	1.5	---	0.0	1.5	8.0	12.5
29	---	---	0.0	---	0.0	---	13.0	11.5
30	---	---	0.0	0.0	0.0	---	13.0	14.5
31	---	---	---	0.0	0.0	---	9.0	---

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
		OCTOBER			NOVEMBER			DECEMBER	
1	6.4	44	0.76	10	12	0.32	8.5	18	0.41
2	6.2	40	0.67	9.9	13	0.35	8.9	17	0.41
3	6.1	47	0.77	9.5	29	0.74	8.5	46	1.1
4	6.3	43	0.73	9.1	18	0.44	8.5	81	1.9
5	6.8	26	0.48	9.0	13	0.32	8.5	10	0.23
6	17	36	1.7	9.0	12	0.29	8.4	34	0.77
7	15	4	0.16	8.7	13	0.31	8.4	15	0.34
8	12	9	0.29	8.4	9	0.20	8.4	29	0.66
9	11	18	0.53	22	21	1.2	8.4	18	0.41
10	9.8	11	0.29	19	10	0.51	8.2	31	0.69
11	9.3	13	0.33	14	12	0.45	7.8	22	0.46
12	8.8	16	0.38	11	14	0.42	7.4	22	0.44
13	8.7	38	0.89	9.6	13	0.34	7.1	19	0.36
14	7.9	38	0.81	9.1	12	0.29	6.8	28	0.51
15	7.3	21	0.41	8.3	31	0.69	6.8	234	4.3
16	6.9	21	0.39	7.8	19	0.40	6.6	15	0.27
17	6.8	20	0.37	7.6	53	1.1	6.8	118	2.2
18	6.8	19	0.35	7.6	19	0.39	6.6	24	0.43
19	7.3	20	0.39	7.7	25	0.52	6.6	29	0.52
20	8.4	9	0.20	8.7	23	0.54	6.6	13	0.23
21	8.6	14	0.33	18	17	0.83	6.6	102	1.8
22	8.8	9	0.21	13	27	0.95	6.6	31	0.55
23	8.8	16	0.38	10	22	0.59	6.6	22	0.39
24	10	20	0.54	8.6	31	0.72	6.6	25	0.45
25	9.9	23	0.61	8.3	28	0.63	6.6	15	0.27
26	9.5	20	0.51	14	26	0.98	6.4	26	0.45
27	9.0	11	0.27	23	11	0.68	6.2	23	0.39
28	8.6	24	0.56	19	18	0.92	6.2	22	0.37
29	8.6	20	0.46	13	16	0.56	6.2	29	0.49
30	8.9	20	0.48	10	19	0.51	6.2	46	0.77
31	12	18	0.58	---	---	---	6.2	43	0.72
TOTAL	277.5	---	15.83	342.9	---	17.19	224.2	---	23.29

04096272 BEEBE CREEK NEAR HILLSDALE, MI--CONTINUED

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
		JANUARY			FEBRUARY			MARCH	
1	6.2	34	0.57	6.2	12	0.20	33	8	0.71
2	6.2	54	0.90	6.2	17	0.28	28	7	0.53
3	6.2	65	1.1	6.1	87	1.4	26	4	0.28
4	6.0	58	0.94	6.0	66	1.1	119	25	8.0
5	5.8	35	0.55	6.0	92	1.5	196	10	5.3
6	5.8	32	0.50	6.0	63	1.0	158	7	3.0
7	5.8	33	0.52	6.0	56	0.91	110	9	2.7
8	5.6	25	0.38	6.0	80	1.3	89	4	0.96
9	5.6	37	0.56	6.0	72	1.2	83	5	1.1
10	5.5	41	0.61	6.0	49	0.79	78	11	2.3
11	5.5	107	1.6	6.2	58	0.97	71	5	0.96
12	5.5	125	1.9	6.4	28	0.48	69	3	0.56
13	5.5	37	0.55	6.5	44	0.77	75	3	0.61
14	5.5	65	0.97	6.6	32	0.57	72	3	0.58
15	5.5	36	0.53	6.5	22	0.39	65	3	0.53
16	5.5	44	0.65	6.4	111	1.9	57	3	0.46
17	5.5	39	0.58	6.4	50	0.86	49	3	0.40
18	5.5	29	0.43	6.6	30	0.53	45	3	0.36
19	5.5	27	0.40	6.5	32	0.56	43	3	0.35
20	5.7	27	0.42	6.4	31	0.54	43	4	0.46
21	5.8	17	0.27	6.2	23	0.39	41	6	0.66
22	5.6	23	0.35	6.2	41	0.69	43	8	0.93
23	5.4	24	0.35	16	68	2.9	42	1	0.11
24	5.6	16	0.24	87	29	6.8	41	2	0.22
25	6.0	16	0.26	81	14	3.1	40	1	0.11
26	6.2	16	0.27	56	6	0.91	41	2	0.22
27	6.6	17	0.30	43	7	0.81	45	3	0.36
28	6.7	22	0.40	38	7	0.72	89	4	0.96
29	6.6	8	0.14	---	---	---	143	3	1.2
30	6.5	10	0.18	---	---	---	143	3	1.2
31	6.4	14	0.24	---	---	---	115	2	0.62
TOTAL	181.3	---	17.66	458.4	---	33.57	2292	---	36.74

DAY	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCENTRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
		APRIL			MAY	
1	91	5	1.2	34	34	3.1
2	82	5	1.1	32	8	0.69
3	80	6	1.3	31	8	0.67
4	72	4	0.78	31	10	0.84
5	72	5	0.97	32	8	0.69
6	69	3	0.56	32	8	0.69
7	63	3	0.51	29	9	0.70
8	56	3	0.45	26	9	0.63
9	49	3	0.40	25	11	0.74
10	45	4	0.49	22	9	0.53
11	41	8	0.89	20	18	0.97
12	37	5	0.50	19	17	0.87
13	34	7	0.64	18	10	0.49
14	31	7	0.59	17	12	0.55
15	29	7	0.55	16	14	0.60
16	26	6	0.42	15	---	---
17	26	5	0.35	14	---	---
18	26	6	0.42	17	---	---
19	21	12	0.68	19	---	---
20	17	10	0.46	16	---	---
21	18	12	0.58	14	---	---
22	26	14	0.98	13	--	---
23	47	13	1.6	12	---	---
24	53	10	1.4	11	---	---
25	50	6	0.81	10	---	---
26	49	23	3.0	9.5	---	---
27	45	9	1.1	9.0	---	---
28	44	11	1.3	8.0	---	---
29	43	11	1.3	7.0	---	---
30	38	5	0.51	6.0	---	---
31	---	---	---	6.2	---	---
TOTAL	1380	---	25.84	570.7	---	12.76

04096273 ST. JOSEPH RIVER NEAR HILLSDALE, MI

LOCATION.--Lat 41°57'23", long 84°39'31", in SW¼ SE¼ sec.9, T.6 S., R.3 W., Hillsdale County, Hydrologic Unit 04050001, at bridge on Moore Road, 0.9 mi (1.4 km) downstream from Beebe Creek, 2.7 mi (4.3 km) northwest of Hillsdale.

DRAINAGE AREA.--62.4 mi² (161.6 km²).

PERIOD OF RECORD.--Water years 1974 to May 1977 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)
DEC 17...	1100	771	7.7	1.5	8	12.8	310	55	80	27	31

DATE	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)	DISSOLVED SILICA (SIO2) (MG/L)
DEC 17...	18	.8	2.8	312	0	256	10	49	58	.4	10

DATE	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)
DEC 17...	430	419	.58	1.3	.52	1.6	1	0	30	1

DATE	TOTAL COPPER (CU) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)	CYANIDE (CN) (MG/L)
DEC 17...	20	30	5	80	<.5	42	0	1	20	.00

04096273 ST. JOSEPH RIVER NEAR HILLSDALE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITRITE (NO2) (MG/L)
NOV												
01...	1300	18	660	7.6	6.0	--	1.0	1.0	4.4	.09	.09	.30
FEB												
25...	1430	E125	431	7.2	.5	--	1.3	1.3	5.5	.05	.05	.16
MAR												
08...	1325	136	405	7.5	5.0	--	1.7	1.7	7.7	.06	.06	.20
APR												
18...	1050	40	555	7.7	15.0	8.2	.67	--	--	.05	--	--

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)	TOTAL NITROGEN (NO3) (MG/L)
NOV												
01...	1.1	1.1	.54	.52	.67	.56	.48	1.1	1.0	2.2	2.1	9.7
FEB												
25...	1.3	1.3	.63	.59	.76	1.4	.91	2.0	1.5	3.3	2.8	15
MAR												
08...	1.8	1.8	.35	.33	.43	--	1.2	--	1.5	--	3.3	--
APR												
18...	.72	--	.22	--	--	.88	--	1.1	--	1.8	--	8.1

DATE	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL HYDROLYZABLE PHOSPHORUS (P) (MG/L)	DIS. HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DIS. ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
NOV											
01...	.39	.35	.35	.05	.05	--	--	.39	.05	.00	.25
FEB											
25...	.23	.15	.12	.12	.37	.11	.03	.23	.15	.00	.00
MAR											
08...	.12	.07	.08	.05	.15	.02	.03	.10	.08	.02	--
APR											
18...	.20	--	.09	--	--	--	--	--	--	--	--

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
NOV				
01...	1300	18	4	.19
FEB				
25...	1430	E125	20	E6.8
MAR				
08...	1325	136	9	3.3

E--ESTIMATED VALUE

04096276 ST. JOSEPH RIVER AT JONESVILLE, MI

LOCATION.--Lat 41°58'58", long 84°39'52", in NE¼ NW¼ sec.4, T.6 S., R.3 W., Hillsdale County, Hydrologic Unit 04050001, at bridge on Chicago Street at Jonesville.

DRAINAGE AREA.--66.5 mi² (172.2 km²).

PERIOD OF RECORD.--Water years 1974 to May 1977 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA+MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)
DEC 17...	1000	804	7.6	2.0	8	13.0	330	64	84	28	34

DATE	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)	DISSOLVED SILICA (SIO2) (MG/L)
DEC 17...	18	.8	2.8	318	0	261	13	51	66	.4	10

DATE	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)
DEC 17...	455	442	.62	1.7	.39	1.2	2	0	30	1

DATE	TOTAL COPPER (CU) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)	CYANIDE (CN) (MG/L)
DEC 17...	30	20	3	80	<.5	54	0	1	20	.00

04096276 ST. JOSEPH RIVER AT JONESVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITRITE (NO2) (MG/L)
OCT												
12...	0915	20	710	7.7	11.0	--	1.2	1.2	5.3	.12	.12	.39
NOV												
01...	1430	21	700	7.7	7.5	--	1.2	1.2	5.3	.09	.09	.30
FEB												
01...	1010	13	760	--	.5	11.5	1.2	1.2	5.5	.07	.06	.20
25...	1645	E135	410	7.4	.0	13.0	1.3	1.3	5.5	.05	.05	.16
MAR												
16...	1000	115	450	7.7	7.0	10.5	1.2	1.2	5.1	.04	.04	.13
APR												
18...	1125	47	560	7.7	17.5	8.6	.75	--	--	.06	--	--
MAY												
25...	1300	18	690	7.9	26.0	11.2	.89	.85	3.8	.08	.10	.33

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)	TOTAL NITROGEN (NO3) (MG/L)
OCT												
12...	1.3	1.3	.42	.41	.53	.58	.42	1.0	.83	2.3	2.1	10
NOV												
01...	1.3	1.3	.49	.45	.58	.71	.45	1.2	.90	2.5	2.2	11
FEB												
01...	1.3	1.3	4.1	4.0	5.2	3.6	2.7	7.7	6.7	9.0	8.0	40
25...	1.3	1.3	.55	.50	.64	1.2	1.0	1.7	1.5	3.0	2.8	13
MAR												
16...	1.2	1.2	.34	.32	.41	.96	.63	1.3	.95	2.5	2.2	11
APR												
18...	.81	--	.31	--	--	.99	--	1.3	--	2.1	--	9.3
MAY												
25...	.97	.95	.18	.01	.01	1.1	.50	1.3	.51	2.3	1.5	10

DATE	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL HYDROLYZABLE PHOSPHORUS (P) (MG/L)	DIS. HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DIS. ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
OCT											
12...	.36	.24	.26	.21	.64	--	--	.33	.21	.00	.00
NOV											
01...	.37	.21	.22	--	--	--	--	.25	.22	.00	--
FEB											
01...	.94	.67	.64	.61	1.9	--	--	--	--	--	--
25...	.19	.13	.11	.11	.34	.06	.00	.17	.10	.02	.03
MAR											
16...	.18	.09	.07	.06	.18	.09	.03	.16	.09	.02	.00
APR											
18...	.22	--	.08	--	--	--	--	--	--	--	--
MAY											
25...	.30	.15	.18	.15	.46	--	--	--	--	--	--

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
OCT				
12...	0915	20	10	.54
NOV				
01...	1430	21	14	.79
FEB				
01...	1010	13	2	.07
25...	1645	E135	12	E4.4
MAR				
16...	1000	115	8	2.5
MAY				
25...	1300	18	28	1.4

E--ESTIMATED VALUE

04096280 BUTTERNUT CREEK NEAR JONESVILLE, MI

LOCATION.--Lat 41°58'58", long 84°42'34", NW¼ NW¼ sec.6, T.6 S., R.3 W., Hillsdale County, Hydrologic Unit 04050001, at New York Central Railroad Bridge, 1.5 mi (2.4 km) west of Jonesville.

DRAINAGE AREA.--1.88 mi² (4.87 km²).

PERIOD OF RECORD.--Water years 1974 to May 1977 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)
DEC 16...	1200	.30	520	7.8	1.0	10	14.8	300	66	81	23

DATE	DISSOLVED SODIUM (NA) (MG/L)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
DEC 16...	5.8	4	.1	.9	282	0	231	7.2	34	20	.1

DATE	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	DISSOLVED SOLIDS (TONS PER DAY)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)
DEC 16...	8.4	340	330	.46	.28	3.9	.00	.00	0	0	<10

DATE	TOTAL COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)
DEC 16...	0	0	10	4	20	<.5	1	0	0	10

04096280 BUTTERNUT CREEK NEAR JONESVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITRITE (NO2) (MG/L)
DEC												
08...	1335	.34	540	7.4	1.0	--	3.7	3.7	16	.01	.01	.03
16...	1200	.30	520	7.8	1.0	14.8	4.0	3.9	17	.01	.01	.03
FEB												
24...	0900	9.7	275	7.3	1.5	9.7	1.6	1.6	7.2	.08	.08	.26
MAR												
16...	1330	1.2	520	7.8	9.5	11.9	2.3	2.3	10	.03	.03	.10
APR												
14...	1310	E1.5	555	8.2	16.0	13.8	2.2	2.2	9.7	.02	.02	.07
MAY												
24...	0925	.26	565	7.8	16.0	--	2.3	2.3	10	.03	.03	.10

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)	TOTAL NITROGEN (NO3) (MG/L)
DEC												
08...	3.7	3.7	.01	.02	.03	--	.26	--	.28	--	4.0	--
16...	4.0	3.9	.01	.01	.01	.27	.27	.28	.28	4.3	4.2	19
FEB												
24...	1.7	1.7	.98	.89	1.1	1.9	1.5	2.9	2.4	4.6	4.1	20
MAR												
16...	2.3	2.3	.05	.03	.04	1.7	1.3	1.7	1.3	4.0	3.6	18
APR												
14...	2.2	2.2	.04	.01	.01	.46	.49	.50	.50	2.7	2.7	12
MAY												
24...	2.3	2.3	.05	.04	.05	.82	.20	.87	.24	3.2	2.5	14

DATE	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL HYDROLYZABLE PHOSPHORUS (P) (MG/L)	DIS. HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DIS. ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
DEC											
08...	.02	.02	.01	.01	.03	--	.00	.02	.01	.00	.00
16...	.02	.02	.00	.00	.00	--	.02	.03	.02	.00	.00
FEB											
24...	.31	.22	.15	.15	.46	--	--	--	--	--	--
MAR											
16...	.16	.02	.03	.01	.03	.13	.02	.16	.03	.00	--
APR											
14...	.04	.03	.01	.01	.03	--	--	--	--	--	--
MAY											
24...	.02	.00	.00	.00	.00	--	--	--	--	--	--

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
DEC					
08...	1335	.34	1.0	18	.02
16...	1210	.30	1.0	6	.00
FEB					
24...	0900	9.7	1.5	6	.16
MAR					
16...	1330	1.2	9.5	100	.32
APR					
14...	1310	E1.5	16.0	38	E.15
MAY					
24...	0925	.26	16.0	30	.02

E--ESTIMATED VALUE

04096288 ST. JOSEPH RIVER AT LITCHFIELD, MI

LOCATION.--Lat 42°02'37", long 84°45'52", in NW¼ NW¼ sec.15, T.5 S., R.4 W., Hillsdale County, Hydrologic Unit 04050001, at bridge on Litchfield Road at Litchfield.

DRAINAGE AREA.--81.0 mi² (209.8 km²).

PERIOD OF RECORD.--Water years 1974 to May 1977 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)
DEC 16...	1000	748	7.5	.5	12	12.7	320	65	84	27	29

DATE	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
DEC 16...	16	.7	2.4	312	0	256	16	46	57	.2

DATE	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO, PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)
DEC 16...	8.6	431	420	.59	2.5	.19	.58	1	0	<10

DATE	TOTAL COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)
DEC 16...	1	10	40	4	30	<.5	10	0	0	10

04096288 ST. JOSEPH RIVER AT LITCHFIELD, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITRITE (NO2) (MG/L)
NOV												
01...	1050	27	690	7.5	4.0	--	1.8	1.8	8.0	.07	.07	.23
DEC												
10...	1000	21	680	7.3	.5	--	2.2	2.3	10	.03	.04	.13
FEB												
24...	1315	320	415	7.7	.5	10.3	1.3	1.4	6.0	.03	.04	.13
MAR												
04...	0945	330	460	7.5	2.5	--	1.6	1.6	7.3	.03	.06	.20
APR												
14...	1100	77	545	7.8	15.0	9.0	1.1	.94	4.2	.04	.06	.20
MAY												
13...	0940	43	650	7.9	18.0	8.4	1.4	1.4	6.0	.06	.05	.16

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)	TOTAL NITROGEN (NO3) (MG/L)
NOV												
01...	1.9	1.9	.08	.06	.08	.42	.44	.50	.50	2.4	2.4	11
DEC												
10...	2.2	2.3	.72	.71	.91	.48	.39	1.2	1.1	3.4	3.4	15
FEB												
24...	1.3	1.4	.89	.82	1.1	--	1.5	--	2.3	--	3.7	--
MAR												
04...	1.6	1.7	.47	.45	.58	1.1	1.1	1.6	1.5	3.2	3.2	14
APR												
14...	1.1	1.0	.14	.01	.01	1.1	.79	1.2	.80	2.3	1.8	10
MAY												
13...	1.5	1.4	.06	.06	.08	1.0	.57	1.1	.63	2.6	2.0	12

DATE	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL HYDROLYZABLE PHOSPHORUS (P) (MG/L)	DIS. HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DIS. ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
NOV											
01...	.22	.13	.16	.14	.43	--	--	.16	.15	.00	.00
DEC											
10...	.35	.20	.31	--	--	--	.00	.34	.28	.00	--
FEB											
24...	.41	.27	.26	.22	.67	--	--	--	--	--	--
MAR											
04...	.17	.13	.09	.08	.25	.06	.03	.15	.11	.02	.02
APR											
14...	.15	.06	.05	.03	.09	--	--	--	--	--	--
MAY											
13...	.19	.09	.11	.08	.25	--	--	--	--	--	--

04096288 ST. JOSEPH RIVER AT LITCHFIELD, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	TEMPERATURE (DEG C)	TOTAL ORGANIC CARBON (C) (MG/L)	TOTAL PCB (UG/L)	POLYCHLORINATED NAPHTHALENES (UG/L)	TOTAL ALDRIN (UG/L)	TOTAL CHLORDANE (UG/L)	TOTAL DDD (UG/L)
NOV										
16...	0925	20	730	.5	4.6	.0	.00	.00	.0	.00

DATE	TOTAL DDE (UG/L)	TOTAL DDT (UG/L)	TOTAL DIAZINON (UG/L)	TOTAL DIELDRIN (UG/L)	TOTAL ENDRIN (UG/L)	TOTAL ETHION (UG/L)	TOTAL HEPTACHLOR (UG/L)	TOTAL HEPTACHLOR EPOXIDE (UG/L)	TOTAL LINDANE (UG/L)
NOV									
16...	.00	.00	.00	.00	.00	.00	.00	.00	.00

DATE	TOTAL MALATHION (UG/L)	TOTAL METHYL PARATHION (UG/L)	TOTAL METHYL TRITHION (UG/L)	TOTAL PARATHION (UG/L)	TOTAL TOXAPHENE (UG/L)	TOTAL TRITHION (UG/L)	TOTAL 2,4-D (UG/L)	TOTAL 2,4,5-T (UG/L)	TOTAL SILVEX (UG/L)
NOV									
16...	.00	.00	.00	.00	0	.00	.00	.00	.00

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
NOV					
01...	1050	27	4.0	2	.15
DEC					
10...	1000	21	.5	6	.34
FEB					
24...	1315	320	.5	12	10
MAR					
04...	0945	330	2.5	5	4.5
APR					
14...	1100	77	15.0	14	2.9
MAY					
13...	0940	43	16.0	14	1.6

04096300 SAND CREEK NEAR JONESVILLE, MI

LOCATION.--Lat 41°55'21", long 84°41'59", in NW¼ SW¼ sec.18, T.6 S., R.3 W., Hillsdale County, Hydrologic Unit 04050001, at bridge on Sand Lake Road, 400 ft (122 m) downstream from North Sand Lake, 3.6 mi (5.8 km) southwest of Jonesville.

DRAINAGE AREA.--9.44 mi² (24.45 km²).

PERIOD OF RECORD.--Water years 1974 to May 1977 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)
DEC 16...	1400	415	8.1	1.5	10	16.0	230	43	58	21	6.4

DATE	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
DEC 16...	4	.1	1.2	229	0	188	2.9	34	9.4	.1

DATE	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO-PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)
DEC 16...	7.5	246	250	.33	.36	.01	.03	0	0	<10

DATE	TOTAL COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)
DEC 16...	0	0	40	3	0	<.5	1	0	1	10

04096300 SAND CREEK NEAR JONESVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITRITE (NO2) (MG/L)
OCT												
12...	1045	6.4	415	7.4	12.0	--	.20	.17	.80	.02	.01	.03
NOV												
23...	1310	4.2	385	8.1	4.5	--	.29	.28	1.2	.02	.01	.03
JAN												
20...	1320	3.2	445	--	1.5	11.6	.41	.41	1.8	.01	.01	.03
FEB												
24...	1515	1.8	420	7.9	2.0	9.0	.56	.52	2.3	.01	.02	.07
MAR												
04...	1535	8.6	310	7.6	2.0	--	.60	.62	2.7	.02	.02	.07
31...	1330	18	395	8.1	8.0	12.5	.49	.49	2.2	.04	.04	.13
MAY												
25...	1105	5.5	400	8.1	26.5	10.7	.24	.25	1.1	.01	.01	.03

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)	TOTAL NITROGEN (NO3) (MG/L)
OCT												
12...	.22	.18	.05	.05	.06	.30	.13	.35	.18	.57	.36	2.5
NOV												
23...	.31	.29	.12	.10	.13	--	--	.38	--	.69	.77	3.1
JAN												
20...	.42	.42	.15	.15	.19	.51	.34	.66	.49	1.1	.91	4.8
FEB												
24...	.57	.54	.19	.19	.24	.35	.31	.54	.50	1.1	1.0	4.9
MAR												
04...	.62	.64	.28	.28	.36	.54	.57	.82	.85	1.4	1.5	6.4
31...	.53	.53	.13	.10	.13	.37	.30	.50	.40	1.0	.93	4.6
MAY												
25...	.25	.26	.07	.04	.05	.41	.23	.48	.27	.73	.53	3.2

DATE	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL HYDROLYZABLE PHOSPHORUS (P) (MG/L)	DIS. HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DIS. ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
OCT											
12...	.05	.04	--	.03	.09	--	--	.01	.02	--	.00
NOV											
23...	.02	.03	.00	.00	.00	--	.03	.03	.03	.00	.00
JAN											
20...	.02	.01	.00	.00	.00	--	--	--	--	--	--
FEB											
24...	.03	.01	.00	.00	.00	--	--	--	--	--	--
MAR											
04...	.05	.02	.02	.01	.03	.01	.00	.03	.01	.02	.01
31...	.01	.01	.03	.01	.03	--	--	--	--	--	--
MAY											
25...	.00	.00	.00	.00	.00	--	--	--	--	--	--

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
OCT				
12...	1045	6.4	10	.17
NOV				
23...	1310	4.2	12	.14
JAN				
20...	1320	3.2	6	.05
FEB				
24...	1515	1.8	4	.02
MAR				
04...	1535	8.6	1	.02
31...	1330	18	5	.24
MAY				
25...	1105	5.5	10	.15

04096312 SAND CREEK AT LITCHFIELD, MI

LOCATION.--Lat 42°01'45", long 84°46'47", in NE¼ NW¼ sec.21, T.5 S., R.4 W., Hillsdale County, Hydrologic Unit 04050001, on right bank 20 ft (6 m) upstream from bridge on Herring Road, 1.0 mi (1.6 km) southwest of Litchfield, and 3.0 mi (4.8 km) upstream from mouth.

DRAINAGE AREA.--20.6 mi² (53.4 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1974 to September 1977 (discontinued as a continuous-record station; converted to a crest-stage partial-record station).

GAGE.--Water-stage recorder. Altitude of gage is 1,000 ft (305 m) from topographic map (nearest 10 ft).

REMARKS.--Water-discharge records good except those for the winter period, which are fair.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 131 ft³/s (3.71 m³/s) Mar. 3, 1976, gage height, 4.85 ft (1.470 m); minimum, 3.2 ft³/s (0.091 m³/s) July 14, 15, Aug. 2, 1977; minimum gage height, 0.92 ft (0.280 m) Aug. 2, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 84 ft³/s (2.38 m³/s) Mar. 4, gage height, 3.72 ft (1.134 m); minimum, 3.2 ft³/s (0.091 m³/s) July 14, 15, Aug. 2; minimum gage height, 0.92 ft (0.280 m) Aug. 2.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.9	10	13	8.8	8.4	17	32	20	9.2	11	4.4	7.7
2	8.7	10	11	8.4	8.4	18	37	20	9.3	8.7	4.0	9.0
3	8.4	10	11	8.4	8.3	18	34	19	8.7	7.8	4.4	8.6
4	8.3	10	12	8.5	8.2	71	32	19	8.3	9.6	3.8	8.3
5	8.3	9.8	11	7.7	8.2	46	34	19	9.8	9.0	4.8	8.1
6	16	9.7	11	7.8	8.2	32	32	19	10	8.1	4.6	7.9
7	15	9.5	11	8.2	8.2	29	30	18	9.4	7.3	7.9	7.6
8	13	9.3	10	7.4	8.2	28	29	17	8.9	7.0	7.6	7.4
9	13	9.4	11	8.0	8.0	29	27	16	14	6.5	7.4	7.0
10	12	9.5	11	7.9	8.0	29	26	16	12	6.5	10	6.6
11	11	9.5	9.9	7.5	8.4	27	25	15	12	6.0	9.8	6.4
12	11	9.2	10	7.5	9.0	29	23	14	12	6.2	10	6.2
13	11	9.1	9.8	7.5	9.2	30	22	14	12	4.8	9.0	8.8
14	11	9.1	9.6	7.5	9.2	29	21	13	11	3.8	8.2	9.5
15	11	9.0	9.8	7.5	8.9	28	21	13	9.5	4.4	7.6	9.2
16	9.8	8.9	9.5	7.5	8.5	26	20	12	8.9	5.6	7.5	11
17	9.6	8.9	9.3	7.5	9.1	24	20	12	9.0	6.3	6.7	10
18	9.5	8.9	9.1	7.5	9.3	26	19	13	8.9	5.6	6.3	12
19	9.6	9.1	9.2	7.6	8.8	25	19	13	8.4	5.9	6.4	13
20	10	9.0	10	7.9	8.6	25	18	12	7.9	5.1	6.4	12
21	10	9.1	9.0	7.5	7.9	24	18	11	8.1	5.8	6.9	11
22	10	9.0	9.0	7.7	8.4	26	21	11	8.1	7.3	7.4	11
23	10	8.9	9.3	7.5	20	25	26	11	7.9	6.7	6.9	10
24	10	8.9	8.8	7.9	95	25	24	11	7.4	6.6	7.3	15
25	10	9.0	9.3	8.2	28	24	24	11	7.5	5.6	7.2	16
26	9.9	11	8.8	8.5	23	25	23	10	7.0	5.0	7.4	30
27	9.6	10	8.2	8.8	22	24	22	10	6.9	5.0	7.0	23
28	9.5	15	9.2	9.0	21	46	23	9.8	6.5	4.4	6.8	19
29	9.6	13	7.8	9.0	---	49	22	9.6	7.1	5.3	8.0	17
30	9.7	12	8.4	8.8	---	37	21	9.4	8.3	5.9	8.0	15
31	11	---	8.5	8.5	---	34	---	9.2	---	5.8	7.6	---
TOTAL	324.4	299.8	304.9	247.7	356.5	927	744	427.0	274.0	198.6	217.3	343.3
MEAN	10.5	9.99	9.84	7.99	12.7	29.9	24.8	13.8	9.13	6.41	7.01	11.4
MAX	16	16	13	9.0	95	71	37	20	14	11	10	30
MIN	8.3	8.9	7.4	7.4	7.9	18	18	9.2	6.5	3.8	3.8	6.2
CFSM	.51	.49	.48	.39	.62	1.45	1.20	.67	.44	.31	.34	.55
IN.	.59	.54	.55	.45	.64	1.67	1.34	.77	.49	.36	.39	.62

CAL YR 1976 TOTAL 9309.9 MEAN 25.4 MAX 121 MIN 6.8 CFSM 1.23 IN 16.81
WTR YR 1977 TOTAL 4664.5 MEAN 12.8 MAX 71 MIN 3.8 CFSM .62 IN 8.42

04096312 SAND CREEK AT LITCHFIELD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water year 1974 to May 1977 (discontinued).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: August 1974 to September 1976.
SUSPENDED SEDIMENT DISCHARGE: August 1974 to May 1977.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum daily, 21.5°C June 23, 24, 1975; minimum daily, 0.0°C on many days during winter periods.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 159 mg/L Feb. 21, 1976; minimum daily mean, 2 mg/L Jan. 20, Feb. 2, 1975, Jan. 8, 1977.
SEDIMENT DISCHARGES: Maximum daily, 31 tons (28 tonnes) Feb. 21, 1976; minimum daily, 0.04 ton (0.04 tonne) Jan. 8, 1977.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATIONS: Maximum daily mean, 104 mg/L Mar. 30; minimum daily mean, 2 mg/L Jan. 8.
SEDIMENT DISCHARGES: Maximum daily, 10 tons (9 tonnes) Mar. 30; minimum daily, 0.04 ton (0.04 tonne) Jan. 8

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)
DEC 16...	1050	9.4	523	7.7	1.0	27	14.8	270	60	72	22

DATE	DISSOLVED SODIUM (NA) (MG/L)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
DEC 16...	5.2	4	.1	1.0	257	0	211	8.2	49	13	.1

DATE	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	DISSOLVED SOLIDS (TONS PER DAY)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)
DEC 16...	8.6	297	303	.40	7.54	1.2	.00	.00	1	0	<10

DATE	TOTAL COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)
DEC 16...	0	0	70	3	70	<.5	1	0	0	10

04096312 SAND CREEK AT LITCHFIELD, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITRITE (NO2) (MG/L)
OCT												
20...	0955	9.5	515	7.7	2.5	--	1.1	1.1	4.9	.01	.01	.03
DEC												
10...	1135	11	485	7.7	2.0	--	1.1	1.2	5.3	.01	.01	.03
JAN												
19...	0955	7.6	505	--	.5	9.6	1.2	1.2	5.2	.02	.02	.07
FEB												
10...	0920	8.2	515	--	1.0	--	1.2	1.2	5.2	.02	.03	.10
26...	1040	24	465	7.9	2.5	10.1	1.3	1.3	5.7	.04	.02	.07
MAR												
04...	1250	81	405	7.2	2.5	--	1.2	1.2	5.2	.04	.03	.10
23...	1145	25	495	7.9	5.0	11.7	1.4	1.2	5.3	.02	.01	.03
APR												
14...	1135	23	490	7.9	13.0	9.4	.98	.98	4.3	.02	.02	.07
MAY												
13...	1300	14	505	7.9	15.5	8.9	.98	.98	4.3	.02	.02	.07

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)	TOTAL NITROGEN (NO3) (MG/L)
OCT												
20...	1.1	1.1	.06	.06	.08	--	.32	--	.38	--	1.5	--
DEC												
10...	1.1	1.2	.07	.08	.10	.23	.20	.30	.28	1.4	1.5	6.2
JAN												
19...	1.2	1.2	.09	.10	.13	.32	.25	.41	.35	1.6	1.6	7.1
FEB												
10...	1.2	1.2	.11	.11	.14	.77	.28	.88	.39	2.1	1.6	9.2
26...	1.3	1.3	.17	.15	.19	--	.75	--	.90	--	2.2	--
MAR												
04...	1.2	1.2	.32	.23	.30	1.1	1.2	1.4	1.4	2.6	2.6	12
23...	1.4	1.2	.15	.05	.06	.25	.35	.40	.40	1.8	1.6	8.0
APR												
14...	1.0	1.0	.04	.02	.03	.36	.38	.40	.40	1.4	1.4	6.2
MAY												
13...	1.0	1.0	.06	.09	.12	.36	.33	.42	.42	1.4	1.4	6.3

DATE	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL HYDROLYZABLE PHOSPHORUS (P) (MG/L)	DIS. HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DIS. ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
OCT											
28...	.04	.03	.01	.01	.03	--	--	.03	.02	.00	.00
DEC											
10...	.03	.02	.01	.03	.09	--	.00	.03	.03	.00	.00
JAN											
19...	.01	.02	.01	.02	.06	--	--	--	--	--	--
FEB											
10...	.02	.01	.00	.01	.03	--	--	--	--	--	--
26...	.03	.01	.00	.00	.00	.04	.03	.04	.03	--	--
MAR											
04...	.16	.09	.06	.04	.12	.07	.03	.13	.07	.03	.02
23...	.03	.03	.01	.01	.03	.01	.01	.02	.02	.01	.01
APR											
14...	.03	.02	.01	.01	.03	--	--	--	--	--	--
MAY											
13...	.01	.00	.00	.00	.00	--	--	--	--	--	--

04096312 SAND CREEK AT LITCHFIELD, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	TEMPERATURE (DEG C)	TOTAL ORGANIC CARBON (C) (MG/L)	TOTAL PCB (UG/L)	PCB IN BOTTOM MATERIAL (UG/KG)	POLYCHLORINATED NAPHTHALENES (UG/L)	TOTAL ALDRIN (UG/L)	ALDRIN IN BOTTOM MATERIAL (UG/KG)
NOV 16...	1000	3.9	560	1.5	3.0	.0	0	.00	.00	.0

DATE	TOTAL CHLORDANE (UG/L)	CHLORDANE IN BOTTOM MATERIAL (UG/KG)	TOTAL DDD (UG/L)	DDD IN BOTTOM MATERIAL (UG/KG)	TOTAL DDE (UG/L)	DDE IN BOTTOM MATERIAL (UG/KG)	TOTAL DDT (UG/L)	DDT IN BOTTOM MATERIAL (UG/KG)	TOTAL DIAZINON (UG/L)	DIAZINON IN BOTTOM MATERIAL (UG/KG)
NOV 16...	.0	0	.00	.0	.00	.0	.00	.0	.00	.0

DATE	TOTAL DIELDRIN (UG/L)	DIELDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ENDRIN (UG/L)	ENDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ETHION (UG/L)	ETHION IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR (UG/L)	HEPTACHLOR IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR EPOXIDE (UG/L)	HEPTACHLOR EPOXIDE IN BOTTOM MATERIAL (UG/KG)
NOV 16...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0

DATE	TOTAL LINDANE (UG/L)	LINDANE IN BOTTOM MATERIAL (UG/KG)	TOTAL MALATHION (UG/L)	MALATHION IN BOTTOM MATERIAL (UG/KG)	TOTAL METHYL PARATHION (UG/L)	METHYL PARATHION IN BOTTOM MATERIAL (UG/KG)	TOTAL METHYL TRITHION (UG/L)	METHYL TRITHION IN BOTTOM MATERIAL (UG/KG)	TOTAL PARATHION (UG/L)	PARATHION IN BOTTOM MATERIAL (UG/KG)
NOV 16...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0

DATE	TOTAL TOXAPHENE (UG/L)	TOXAPHENE IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	TRITHION IN BOTTOM MATERIAL (UG/KG)	TOTAL 2,4-D (UG/L)	2,4-D IN BOTTOM MATERIAL (UG/KG)	TOTAL 2,4,5-T (UG/L)	2,4,5-T IN BOTTOM MATERIAL (UG/KG)	TOTAL SILVEX (UG/L)	SILVEX IN BOTTOM MATERIAL (UG/KG)
NOV 16...	0	0	.00	.0	.00	0	.00	0	.00	0

STREAMS TRIBUTARY TO LAKE MICHIGAN

04096312 SAND CREEK AT LITCHFIELD, MI--CONTINUED

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
		OCTOBER			NOVEMBER			DECEMBER	
1	8.9	16	0.38	10	8	0.22	13	20	0.70
2	8.7	12	0.28	10	5	0.14	11	17	0.50
3	8.4	25	0.57	10	7	0.19	11	17	0.50
4	8.3	20	0.45	10	9	0.24	12	18	0.58
5	8.3	18	0.40	9.8	5	0.13	11	16	0.48
6	16	27	1.2	9.7	7	0.18	11	13	0.39
7	15	14	0.57	9.5	12	0.31	11	15	0.45
8	13	20	0.70	9.3	14	0.35	10	17	0.46
9	13	22	0.77	9.4	8	0.20	11	10	0.30
10	12	15	0.49	9.5	11	0.28	11	10	0.30
11	11	11	0.33	9.5	12	0.31	9.9	13	0.35
12	11	14	0.42	9.2	8	0.20	10	10	0.27
13	11	11	0.33	9.1	17	0.42	9.8	13	0.34
14	11	13	0.39	9.1	17	0.42	9.6	14	0.36
15	11	14	0.42	9.0	24	0.58	9.8	32	0.85
16	9.8	23	0.61	8.9	20	0.48	9.5	9	0.23
17	9.6	18	0.47	8.9	33	0.79	9.3	15	0.38
18	9.5	16	0.41	8.9	15	0.36	9.1	21	0.52
19	9.6	16	0.41	9.1	15	0.37	9.2	10	0.25
20	10	17	0.46	9.0	15	0.36	10	6	0.16
21	10	12	0.32	9.1	15	0.37	9.0	10	0.24
22	10	9	0.24	9.0	15	0.36	9.0	10	0.24
23	10	14	0.38	8.9	15	0.36	9.3	10	0.25
24	10	27	0.73	8.9	18	0.43	8.8	12	0.29
25	10	10	0.27	9.0	15	0.36	9.3	5	0.13
26	9.9	9	0.24	11	15	0.45	8.8	22	0.52
27	9.6	6	0.16	16	20	0.86	8.2	9	0.20
28	9.5	6	0.15	15	20	0.81	9.2	6	0.15
29	9.6	26	0.67	13	20	0.70	7.8	14	0.29
30	9.7	10	0.26	12	27	0.87	8.8	14	0.33
31	11	10	0.30	---	---	---	8.5	9	0.21
TOTAL	324.4	---	13.78	299.8	---	12.10	304.9	---	11.22

DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
		JANUARY			FEBRUARY			MARCH	
1	8.6	3	0.07	8.4	14	0.32	19	10	0.51
2	8.4	4	0.09	8.4	12	0.27	18	18	0.87
3	8.4	4	0.09	8.3	26	0.58	18	5	0.24
4	8.5	5	0.11	8.2	11	0.24	71	10	1.9
5	7.7	9	0.19	8.2	9	0.20	46	13	1.6
6	7.8	4	0.08	8.2	14	0.31	32	14	1.2
7	8.2	7	0.15	8.2	17	0.38	29	11	0.86
8	7.4	2	0.04	8.2	11	0.24	28	11	0.83
9	8.0	7	0.15	8.0	18	0.39	29	10	0.78
10	7.4	15	0.30	8.0	13	0.28	29	8	0.63
11	7.5	9	0.18	8.4	9	0.20	27	23	1.7
12	7.5	9	0.18	9.0	15	0.36	29	12	0.94
13	7.5	7	0.14	9.2	16	0.40	30	11	0.89
14	7.5	7	0.14	9.2	19	0.47	29	12	0.94
15	7.5	7	0.14	8.9	11	0.26	28	7	0.53
16	7.5	6	0.12	8.6	19	0.44	26	12	0.84
17	7.5	7	0.14	9.1	14	0.34	24	16	1.0
18	7.5	3	0.06	9.3	13	0.33	26	11	0.77
19	7.6	7	0.14	8.8	20	0.48	25	7	0.47
20	7.9	11	0.23	8.6	12	0.28	25	14	0.94
21	7.9	8	0.17	7.9	16	0.34	24	9	0.58
22	7.7	7	0.15	8.4	19	0.43	26	10	0.70
23	7.5	8	0.16	20	18	0.97	25	10	0.68
24	7.9	3	0.06	55	39	5.8	25	11	0.74
25	8.2	6	0.13	28	20	1.5	24	11	0.71
26	8.5	13	0.30	23	19	1.2	25	9	0.61
27	8.8	23	0.55	22	15	0.89	24	10	0.65
28	9.0	19	0.46	21	9	0.51	46	21	2.6
29	9.0	69	1.7	---	---	---	49	18	2.4
30	8.8	30	0.71	---	---	---	37	104	10
31	8.5	9	0.21	---	---	---	34	24	2.2
TOTAL	247.7	---	7.34	356.5	---	18.41	927	---	40.31

04096312 SAND CREEK AT LITCHFIELD, MI--CONTINUED

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
		APRIL			MAY	
1	32	22	1.9	20	21	1.1
2	37	88	8.8	20	23	1.2
3	34	21	1.9	19	22	1.1
4	32	17	1.5	19	22	1.1
5	34	21	1.9	19	16	0.82
6	32	17	1.5	19	26	1.3
7	30	18	1.5	18	16	0.78
8	28	16	1.2	17	20	0.92
9	27	23	1.7	16	15	0.65
10	26	17	1.2	16	25	1.1
11	25	15	1.0	15	19	0.77
12	23	19	1.2	14	25	0.94
13	22	24	1.4	14	19	0.72
14	21	16	0.91	13	28	0.98
15	21	26	1.5	13	25	0.88
16	20	21	1.1	12	---	---
17	20	30	1.6	12	---	---
18	19	22	1.1	13	---	---
19	19	21	1.1	13	---	---
20	18	18	0.87	12	---	---
21	18	18	0.87	11	---	---
22	21	18	1.0	11	---	---
23	26	18	1.3	11	---	---
24	24	22	1.4	11	---	---
25	24	22	1.4	11	---	---
26	23	18	1.1	10	---	---
27	22	20	1.2	10	---	---
28	23	23	1.4	9.8	---	---
29	22	11	0.65	9.6	---	---
30	21	27	1.5	9.4	---	---
31	---	---	---	9.2	---	---
TOTAL	744	---	46.70	427.0	---	14.36

04096314 SAND CREEK NEAR LITCHFIELD, MI

LOCATION.--Lat 42°03'04", long 84°48'22", in SW¼ NW¼ sec.6, T.5 S., R.4 W., Hillsdale County, Hydrologic Unit 04050001, at bridge on Storms Road, 2.6 mi (4.2 km) west of Litchfield.

DRAINAGE AREA.--23.2 mi² (60.1 km²).

PERIOD OF RECORD.--Water years 1974 to May 1977 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)
DEC 15...	1520	9.3	535	8.0	2.0	15	15.8	260	52	72	20

DATE	DISSOLVED SODIUM (NA) (MG/L)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
DEC 15...	5.0	4	.1	1.1	256	0	210	4.1	50	14	.1

DATE	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	DISSOLVED SOLIDS (TONS PER DAY)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)
DEC 15...	8.6	311	303	.42	7.81	1.3	.01	.03	0	0	<10

DATE	TOTAL COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)
DEC 15...	1	0	30	2	60	<.5	0	0	0	10

04096314 SAND CREEK NEAR LITCHFIELD, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITRITE (NO2) (MG/L)
OCT												
29...	1130	11	535	7.6	5.5	--	1.3	1.3	5.8	.01	.01	.03
FEB												
02...	1120	14	515	6.8	.0	9.8	1.4	1.4	6.1	.02	.02	.07
25...	1430	35	470	7.8	3.0	7.3	1.5	1.6	7.0	.03	.03	.10
MAR												
04...	1035	16	515	7.1	2.0	--	1.2	1.2	5.1	.03	.04	.13
APR												
11...	1130	32	505	8.0	13.0	10.7	1.1	1.1	4.8	.02	.02	.07
MAY												
13...	1025	16	515	7.8	14.0	8.6	1.1	1.1	4.8	.02	.02	.07

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)	TOTAL NITROGEN (NO3) (MG/L)
OCT												
29...	1.3	1.3	.03	.03	.04	.30	.25	.33	.28	1.6	1.6	7.2
FEB												
02...	1.4	1.4	.10	.10	.13	.64	.29	.74	.39	2.1	1.8	9.5
25...	1.5	1.6	.18	.18	.23	.92	.82	1.1	1.0	2.6	2.6	12
MAR												
04...	1.2	1.2	.45	.32	.41	1.8	1.5	2.2	1.8	3.4	2.0	15
APR												
11...	1.1	1.1	.01	.01	.01	.59	.39	.60	.40	1.7	1.5	7.5
MAY												
13...	1.1	1.1	.05	.05	.06	.46	.49	.51	.54	1.6	1.6	7.1

DATE	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL HYDROLYZABLE PHOSPHORUS (P) (MG/L)	DIS. HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DIS. ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
OCT											
29...	.03	.03	.01	.01	.03	--	--	.02	.02	.00	.01
FEB											
02...	.02	.02	.01	.01	.03	--	--	--	--	--	--
25...	--	.03	.01	.01	.03	.14	.04	.15	.05	--	--
MAR											
04...	.23	.10	.03	.03	.09	.13	.06	.16	.09	.07	.01
APR											
11...	.03	.03	.00	.00	.00	--	--	--	--	--	--
MAY											
13...	.01	.00	.00	.00	.00	--	--	--	--	--	--

STREAMS TRIBUTARY TO LAKE MICHIGAN

04096314 SAND CREEK NEAR LITCHFIELD, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	TEMPERATURE (DEG C)	TOTAL ORGANIC CARBON (C) (MG/L)	TOTAL PCB (UG/L)	PCB IN BOTTOM MATERIAL (UG/KG)	POLYCHLORINATED NAPHTHALENES (UG/L)	TOTAL ALDRIN (UG/L)	ALDRIN IN BOTTOM MATERIAL (UG/KG)
NOV 16...	1100	9.4	350	2.5	4.2	.0	0	.00	.00	.0

DATE	TOTAL CHLORDANE (UG/L)	CHLORDANE IN BOTTOM MATERIAL (UG/KG)	TOTAL DDD (UG/L)	DDD IN BOTTOM MATERIAL (UG/KG)	TOTAL DDE (UG/L)	DDE IN BOTTOM MATERIAL (UG/KG)	TOTAL DDT (UG/L)	DDT IN BOTTOM MATERIAL (UG/KG)	TOTAL DIAZINON (UG/L)	DIAZINON IN BOTTOM MATERIAL (UG/KG)
NOV 16...	.0	0	.00	.6	.00	.2	.00	.0	.00	.0

DATE	TOTAL DIELDRIN (UG/L)	DIELDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ENDRIN (UG/L)	ENDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ETHION (UG/L)	ETHION IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR (UG/L)	HEPTACHLOR IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR EPOXIDE (UG/L)	HEPTACHLOR EPOXIDE IN BOTTOM MATERIAL (UG/KG)
NOV 16...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0

DATE	TOTAL LINDANE (UG/L)	LINDANE IN BOTTOM MATERIAL (UG/KG)	TOTAL MALATHION (UG/L)	MALATHION IN BOTTOM MATERIAL (UG/KG)	TOTAL METHYL PARATHION (UG/L)	METHYL PARATHION IN BOTTOM MATERIAL (UG/KG)	TOTAL METHYL TRITHION (UG/L)	METHYL TRITHION IN BOTTOM MATERIAL (UG/KG)	TOTAL PARATHION (UG/L)	PARATHION IN BOTTOM MATERIAL (UG/KG)
NOV 16...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0

DATE	TOTAL TOXAPHENE (UG/L)	TOXAPHENE IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	TRITHION IN BOTTOM MATERIAL (UG/KG)	TOTAL 2,4-D (UG/L)	2,4-D IN BOTTOM MATERIAL (UG/KG)	TOTAL 2,4,5-T (UG/L)	2,4,5-T IN BOTTOM MATERIAL (UG/KG)	TOTAL SILVEX (UG/L)	SILVEX IN BOTTOM MATERIAL (UG/KG)
NOV 16...	0	0	.00	.0	.00	0	.00	0	.00	0

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
OCT 29...	1130	11	5.5	4	.12
29...	1230	11	5.5	4	.12
FEB 02...	1120	14	.0	1	.04
25...	1430	35	3.0	9	.85
MAR 04...	1035	16	2.0	61	2.6
APR 11...	1130	32	13.0	17	1.5
MAY 13...	1025	16	14.0	20	.86

04096320 SOAP CREEK AT MCLAIN ROAD NEAR LITCHFIELD, MI

LOCATION.--Lat 42°00'32", long 84°47'15", in SW¼ NW¼ sec.28, T.5 S., R.4 W., Hillsdale County, Hydrologic Unit 04050001, at bridge on McLain Road, 3.0 mi (4.8 km) southwest of Litchfield.

DRAINAGE AREA.--4.66 mi² (12.07 km²).

PERIOD OF RECORD.--Water years 1974 to May 1977 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITRITE (NO2) (MG/L)
FEB												
25...	1515	14	425	7.4	.5	9.3	2.5	2.6	11	.04	.04	.13
MAR												
04...	1345	42	285	7.3	2.5	--	1.9	1.9	8.3	.04	.03	.10
APR												
11...	1240	2.8	605	8.2	15.5	13.7	1.4	1.4	6.1	.01	.02	.07
MAY												
25...	0945	1.3	600	7.8	14.5	9.3	.92	.92	4.1	.03	.03	.10

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)	TOTAL NITROGEN (NO3) (MG/L)
FEB												
25...	2.5	2.6	.11	.06	.08	--	.92	--	.98	--	3.6	--
MAR												
04...	1.9	1.9	.11	.07	.09	1.8	1.0	1.9	1.1	3.8	3.0	17
APR												
11...	1.4	1.4	.01	.00	.00	.39	.30	.40	.30	1.8	1.7	8.0
MAY												
25...	.95	.95	.12	.12	.15	.38	.23	.50	.35	1.5	1.3	6.4

DATE	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL HYDROLYZABLE PHOSPHORUS (P) (MG/L)	DIS. HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DIS. ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
FEB											
25...	.04	.03	.00	.00	.00	.04	.03	.04	.03	.00	.00
MAR											
04...	.08	.06	.03	.02	.06	.02	.01	.05	.03	.03	.03
APR											
11...	.02	.02	.00	.00	.00	--	--	--	--	--	--
MAY											
25...	.01	.00	.01	.00	.00	--	--	--	--	--	--

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
FEB				
25...	1515	14	2	.08
MAR				
04...	1345	42	7	.79
APR				
11...	1240	2.8	11	.08
MAY				
25...	0945	1.3	18	.06

04096325 SOAP CREEK NEAR LITCHFIELD, MI

LOCATION.--Lat 42°02'38", long 84°50'10", in SE¼ SW¼ sec.12, T.5 S., R.5 W., Branch County, Hydrologic Unit 04050001, on left bank 10 ft (3 m) downstream from bridge on Litchfield Road, 2.3 mi (3.7 km) upstream from mouth, and 3.5 mi (5.6 km) west of Litchfield.

DRAINAGE AREA.--10.9 mi² (28.2 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1974 to September 1977 (discontinued).

GAGE.--Water-stage recorder. Dec. 1, 1974 to Jan. 1, 1975, nonrecording gage at same site and datum. Altitude of gage is 990 ft (302 m) from topographic map, (nearest 10 ft).

REMARKS.--Water-discharge records fair except those for period of no gage-height record, May 16 to July 29, which are poor.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 138 ft³/s (3.91 m³/s) Mar. 5, 1976, gage height, 4.10 ft (1.250 m); minimum daily, 1.7 ft³/s (0.048 m³/s) Sept. 3-10, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 51 ft³/s (1.44 m³/s) Mar. 4, gage height, 2.22 ft (0.677 m); minimum daily, 1.7 ft³/s (0.048 m³/s) Sept. 3-10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.4	2.9	3.0	2.6	2.7	6.9	17	9.6	5.0	4.8	1.9	1.8
2	3.4	2.9	3.0	2.7	2.7	6.3	20	9.6	5.0	4.6	1.8	1.8
3	3.4	2.9	2.9	2.8	2.7	6.6	16	9.1	4.8	4.2	1.8	1.7
4	3.4	2.9	3.0	2.8	2.7	40	17	9.6	4.8	4.2	1.8	1.7
5	3.6	3.0	3.0	2.8	2.7	31	18	9.6	5.2	4.5	1.8	1.7
6	4.5	3.0	3.0	2.8	2.7	20	18	10	5.4	4.0	2.0	1.7
7	3.9	3.0	3.0	2.8	2.7	16	17	9.6	5.2	3.6	1.9	1.7
8	3.8	2.9	3.0	2.8	2.8	14	16	9.1	5.0	3.3	2.0	1.7
9	3.7	3.0	3.0	2.7	2.8	14	15	9.1	7.6	3.3	1.9	1.7
10	3.6	3.0	3.0	2.8	2.8	14	14	9.1	7.0	3.2	2.0	1.7
11	3.6	3.0	3.0	2.8	2.8	13	14	9.1	6.6	3.1	2.0	1.8
12	3.6	3.0	3.0	2.8	3.0	13	13	8.6	6.3	3.0	2.0	1.8
13	3.5	3.0	3.0	2.8	3.2	14	13	8.6	6.0	3.0	1.9	1.9
14	3.5	3.0	2.9	2.8	3.0	13	12	8.1	5.6	2.9	1.9	1.9
15	3.5	3.0	3.0	2.7	2.9	12	12	8.1	5.2	2.9	1.9	2.0
16	3.4	3.0	3.0	2.8	2.9	11	11	7.8	5.0	2.8	1.9	2.1
17	3.5	3.0	2.9	2.8	2.9	11	10	7.2	4.8	2.7	1.9	2.4
18	3.2	3.1	2.9	2.8	3.0	11	9.5	7.0	4.7	2.7	1.9	2.4
19	3.4	3.1	2.9	2.8	3.1	11	9.0	6.8	4.6	2.7	1.9	2.4
20	3.3	3.0	3.0	2.7	3.3	11	8.6	6.6	4.5	2.7	1.8	2.4
21	3.3	3.0	2.8	2.8	3.2	11	8.6	6.4	4.4	2.6	1.9	2.4
22	3.2	3.0	2.8	2.8	3.4	13	8.4	6.2	4.2	2.6	1.9	2.4
23	3.0	3.1	2.8	2.8	7.7	12	11	6.0	4.0	2.6	1.8	2.4
24	3.2	3.0	2.8	2.8	28	12	11	5.9	4.0	2.6	1.8	2.4
25	3.1	3.0	2.9	2.9	15	12	11	5.8	3.9	2.6	1.8	4.0
26	3.0	3.3	2.8	3.0	11	12	11	5.7	3.8	2.5	1.8	8.0
27	3.1	3.4	2.8	3.1	8.6	12	11	5.6	3.7	2.5	1.8	6.0
28	2.8	3.4	2.8	3.1	7.6	27	11	5.4	3.6	2.4	1.8	4.5
29	2.9	3.2	2.8	3.0	---	32	10	5.3	4.0	2.3	1.8	4.3
30	2.9	3.1	2.6	2.9	---	23	10	5.2	5.0	2.2	1.8	4.0
31	3.0	---	2.6	2.8	---	20	---	5.0	---	2.0	1.8	---
TOTAL	104.7	91.2	90.0	85.4	141.9	474.8	385.1	234.8	148.9	95.1	58.0	78.7
MEAN	3.38	3.04	2.90	2.75	5.07	15.3	12.8	7.57	4.96	3.07	1.87	2.62
MAX	4.5	3.4	3.0	3.1	28	40	20	10	7.6	4.8	2.0	8.0
MIN	2.8	2.9	2.6	2.5	2.7	6.3	8.4	5.0	3.6	2.0	1.8	1.7
CFSM	.31	.28	.27	.25	.47	1.40	1.17	.69	.46	.28	.17	.24
IN.	.36	.31	.31	.29	.48	1.62	1.31	.80	.51	.32	.20	.27

CAL YR 1976 TOTAL 5260.7 MEAN 14.4 MAX 118 MIN 2.6 CFSM 1.32 IN 17.95
WTR YR 1977 TOTAL 1938.6 MEAN 5.45 MAX 40 MIN 1.7 CFSM .50 IN 6.79

STREAMS TRIBUTARY TO LAKE MICHIGAN

04096325 SOAP CREEK NEAR LITCHFIELD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1974 to May 1977 (discontinued).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: December 1974 to September 1976.
SUSPENDED SEDIMENT DISCHARGE: December 1974 to May 1977.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: (Water year 1974) Maximum daily 20.0°C Aug. 25, 1975; minimum daily, 2.0°C Jan. 12-14, 1975.
SEDIMENT CONCENTRATIONS: Maximum daily mean, 189 mg/L July 12, 1976; minimum daily mean, 1 mg/L Jan. 6, 1977.
SEDIMENT DISCHARGES: Maximum daily, 14 tons (13 tonnes) Mar. 2, 1976; minimum daily, 0.01 ton (0.01 tonne) Jan. 6, 1977.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATIONS: Maximum daily mean, 138 mg/L Nov. 24; minimum daily mean, 1 mg/L Jan. 6.
SEDIMENT DISCHARGES: Maximum daily, 5 tons (4 tonnes) Mar. 4; minimum daily, 0.01 ton (0.01 tonne) Jan. 6.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)
DEC 15...	1430	3.0	678	7.6	4.5	10	12.8	360	92	100	26

DATE	DISSOLVED SODIUM (NA) (MG/L)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
DEC 15...	4.2	3	.1	1.0	323	0	265	13	91	13	.1

DATE	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	DISSOLVED SOLIDS (TONS PER DAY)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)
DEC 15...	10	426	406	.58	3.45	.16	.01	.03	1	0	<10

DATE	TOTAL COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)
DEC 15...	1	0	190	1	180	<.5	1	0	0	10

STREAMS TRIBUTARY TO LAKE MICHIGAN

04096325 SOAP CREEK NEAR LITCHFIELD, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITRITE (NO2) (MG/L)
OCT												
28...	1130	2.9	690	7.5	4.5	--	.16	.16	.70	.01	.01	.03
DEC												
09...	1040	3.0	630	7.2	1.5	--	.17	.18	.80	.01	.04	.13
JAN												
19...	1135	2.6	640	--	1.5	9.0	.11	.11	.49	.01	.01	.03
FEB												
10...	1040	2.3	660	--	3.5	--	.11	.11	.49	.01	.01	.03
25...	1350	13	500	7.6	3.0	7.8	2.3	2.2	9.5	.05	.05	.16
MAR												
04...	1200	46	265	7.2	2.5	--	1.8	1.8	7.8	.04	.03	.10
23...	0940	12	620	7.6	4.0	10.9	1.4	1.4	6.2	.02	.01	.03
MAY												
13...	1140	8.6	680	7.5	13.0	8.4	.45	.46	2.0	.02	.01	.03

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)	TOTAL NITROGEN (NO3) (MG/L)
OCT												
28...	.17	.17	.05	.05	.06	.23	.20	.28	.25	.45	.42	2.0
DEC												
09...	.18	.22	.06	.07	.09	.19	.26	.25	.33	.43	.55	1.9
JAN												
19...	.12	.12	.08	.08	.10	.33	.31	.41	.39	.53	.51	2.3
FEB												
10...	.12	.12	.06	.06	.08	.27	.27	.33	.33	.45	.45	2.0
25...	2.3	2.2	.26	.16	.21	.63	.84	.89	1.0	3.2	3.2	14
MAR												
04...	1.8	1.8	.23	.15	.19	1.5	1.3	1.7	1.4	3.5	3.2	16
23...	1.4	1.4	.01	.01	.01	--	.49	--	.50	--	1.9	--
MAY												
13...	.47	.47	.09	.08	.10	.35	.22	.44	.30	.91	.77	4.0

DATE	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL HYDROLYZABLE PHOSPHORUS (P) (MG/L)	DIS. HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DIS. ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
OCT											
28...	--	.07	.01	.01	.03	--	--	.02	.01	--	.05
DEC											
09...	.02	.03	.01	.01	.03	--	.00	.02	.01	.00	.01
JAN											
19...	.02	.01	.01	.01	.03	--	--	--	--	--	--
FEB											
10...	.02	.01	.01	.01	.03	--	--	--	--	--	--
25...	.07	.03	.03	.00	.00	.03	.03	.06	.03	.01	.00
MAR											
04...	.21	.09	.05	.03	.09	.12	.03	.17	.06	.04	.03
23...	.03	.02	.02	.01	.03	.01	.02	.03	.03	.00	--
MAY											
13...	.01	.00	.00	.00	.00	--	--	--	--	--	--

04096325 SOAP CREEK NEAR LITCHFIELD, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	TEMPERATURE (DEG C)	TOTAL ORGANIC CARBON (C) (MG/L)	TOTAL PCB (UG/L)	PCB IN BOTTOM MATERIAL (UG/KG)	POLYCHLORINATED NAPHTHALENES (UG/L)	TOTAL ALDRIN (UG/L)	ALDRIN IN BOTTOM MATERIAL (UG/KG)
NOV 16...	1150	3.0	710	4.5	6.2	.0	0	.00	.00	.0

DATE	TOTAL CHLORDANE (UG/L)	CHLORDANE IN BOTTOM MATERIAL (UG/KG)	TOTAL DDD (UG/L)	DDD IN BOTTOM MATERIAL (UG/KG)	TOTAL DDE (UG/L)	DDE IN BOTTOM MATERIAL (UG/KG)	TOTAL DDT (UG/L)	DDT IN BOTTOM MATERIAL (UG/KG)	TOTAL DIAZINON (UG/L)	DIAZINON IN BOTTOM MATERIAL (UG/KG)
NOV 16...	.0	0	.00	.6	.00	.4	.00	.0	.00	.0

DATE	TOTAL DIELDRIN (UG/L)	DIELDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ENDRIN (UG/L)	ENDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ETHION (UG/L)	ETHION IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR (UG/L)	HEPTACHLOR IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR EPOXIDE (UG/L)	HEPTACHLOR EPOXIDE IN BOTTOM MATERIAL (UG/KG)
NOV 16...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0

DATE	TOTAL LINDANE (UG/L)	LINDANE IN BOTTOM MATERIAL (UG/KG)	TOTAL MALATHION (UG/L)	MALATHION IN BOTTOM MATERIAL (UG/KG)	TOTAL METHYL PARATHION (UG/L)	METHYL PARATHION IN BOTTOM MATERIAL (UG/KG)	TOTAL METHYL TRITHION (UG/L)	METHYL TRITHION IN BOTTOM MATERIAL (UG/KG)	TOTAL PARATHION (UG/L)	PARATHION IN BOTTOM MATERIAL (UG/KG)
NOV 16...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0

DATE	TOTAL TOXAPHENE (UG/L)	TOXAPHENE IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	TRITHION IN BOTTOM MATERIAL (UG/KG)	TOTAL 2,4-D (UG/L)	2,4-D IN BOTTOM MATERIAL (UG/KG)	TOTAL 2,4,5-T (UG/L)	2,4,5-T IN BOTTOM MATERIAL (UG/KG)	TOTAL SILVEX (UG/L)	SILVEX IN BOTTOM MATERIAL (UG/KG)
NOV 16...	0	0	.00	.0	.00	0	.00	0	.00	0

04096325 SOAP CREEK NEAR LITCHFIELD, MI--CONTINUED

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
		OCTOBER			NOVEMBER			DECEMBER	
1	3.4	31	0.28	2.9	83	0.65	3.0	58	0.47
2	3.4	67	0.62	2.9	62	0.49	3.0	49	0.40
3	3.4	50	0.46	2.9	82	0.64	2.9	35	0.27
4	3.4	40	0.37	2.9	66	0.52	3.0	42	0.34
5	3.6	38	0.37	3.0	103	0.83	3.0	27	0.22
6	4.5	40	0.49	3.0	66	0.53	3.0	28	0.23
7	3.9	42	0.44	3.0	85	0.69	3.0	25	0.20
8	3.8	25	0.26	2.9	60	0.47	3.0	26	0.21
9	3.7	50	0.50	3.0	70	0.57	3.0	18	0.15
10	3.6	34	0.33	3.0	86	0.70	3.0	16	0.13
11	3.6	46	0.45	3.0	57	0.46	3.0	16	0.13
12	3.6	39	0.38	3.0	36	0.29	3.0	15	0.12
13	3.5	59	0.56	3.0	52	0.42	3.0	13	0.11
14	3.5	76	0.72	3.0	51	0.41	2.9	17	0.13
15	3.5	79	0.75	3.0	61	0.49	3.0	59	0.48
16	3.4	34	0.31	3.0	54	0.44	3.0	64	0.52
17	3.5	62	0.59	3.0	76	0.62	2.9	81	0.63
18	3.2	103	0.89	3.1	52	0.44	2.9	63	0.49
19	3.4	44	0.40	3.1	48	0.40	2.9	55	0.43
20	3.3	40	0.36	3.0	32	0.26	3.0	54	0.44
21	3.3	50	0.45	3.0	42	0.34	2.8	54	0.41
22	3.2	58	0.50	3.0	55	0.45	2.8	44	0.33
23	3.0	65	0.53	3.1	67	0.56	2.8	45	0.34
24	3.2	41	0.35	3.0	138	1.1	2.8	46	0.35
25	3.1	66	0.55	3.0	32	0.26	2.9	55	0.43
26	3.0	62	0.50	3.3	36	0.32	2.8	51	0.39
27	3.1	112	0.94	3.4	51	0.47	2.8	67	0.51
28	2.8	43	0.33	3.4	59	0.54	2.8	46	0.35
29	2.9	88	0.69	3.2	53	0.46	2.8	49	0.37
30	2.9	85	0.67	3.1	62	0.52	2.6	60	0.42
31	3.0	85	0.69	---	---	---	2.6	28	0.20
TOTAL	104.7	---	15.73	91.2	---	15.34	90.0	---	10.20

DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
		JANUARY			FEBRUARY			MARCH	
1	2.6	40	0.28	2.7	25	0.18	6.9	94	1.8
2	2.7	45	0.33	2.7	18	0.13	6.3	73	1.2
3	2.8	25	0.19	2.7	13	0.09	6.6	65	1.2
4	2.8	29	0.22	2.7	5	0.04	40	46	5.0
5	2.8	2	0.02	2.7	20	0.15	31	20	1.7
6	2.8	1	0.01	2.7	40	0.29	20	36	1.9
7	2.8	7	0.05	2.7	31	0.23	16	89	3.8
8	2.8	53	0.40	2.8	20	0.15	14	73	2.8
9	2.7	83	0.61	2.8	18	0.14	14	70	2.6
10	2.6	9	0.06	2.8	36	0.27	14	85	3.2
11	2.6	33	0.23	2.8	26	0.20	13	25	0.88
12	2.6	14	0.10	3.0	36	0.29	13	20	0.70
13	2.6	13	0.09	3.2	12	0.10	14	15	0.57
14	2.6	9	0.06	3.0	52	0.42	13	22	0.77
15	2.7	22	0.16	2.9	55	0.43	12	41	1.3
16	2.6	30	0.21	2.9	61	0.48	11	15	0.45
17	2.5	7	0.05	2.9	82	0.64	11	10	0.30
18	2.5	26	0.18	3.0	78	0.63	11	20	0.59
19	2.6	4	0.03	3.1	91	0.76	11	24	0.71
20	2.7	20	0.15	3.3	58	0.52	11	15	0.45
21	2.8	11	0.08	3.2	55	0.48	11	30	0.89
22	2.8	3	0.02	3.4	55	0.50	13	11	0.39
23	2.8	48	0.36	7.7	54	1.1	12	15	0.49
24	2.8	29	0.22	28	37	2.8	12	10	0.32
25	2.9	30	0.23	15	30	1.2	12	31	1.0
26	3.0	29	0.23	11	28	0.83	12	18	0.58
27	3.1	22	0.18	8.6	37	0.86	12	8	0.26
28	3.1	40	0.33	7.6	82	1.7	27	10	0.73
29	3.0	30	0.24	---	---	---	32	11	0.95
30	2.9	24	0.19	---	---	---	23	21	1.3
31	2.8	32	0.24	---	---	---	20	36	1.9
TOTAL	85.4	---	5.75	141.9	---	15.61	474.8	---	40.73

04096325 SOAP CREEK NEAR LITCHFIELD, MI--CONTINUED

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
		APRIL			MAY	
1	17	35	1.6	9.6	52	1.3
2	20	33	1.8	9.6	86	2.2
3	18	3	0.15	9.1	68	1.7
4	17	26	1.2	9.6	57	1.5
5	18	35	1.7	9.6	62	1.6
6	18	34	1.7	10	75	2.0
7	17	33	1.5	9.6	60	1.6
8	16	31	1.3	9.1	49	1.2
9	15	31	1.3	9.1	49	1.2
10	14	31	1.2	9.1	43	1.1
11	14	30	1.1	9.1	37	0.91
12	13	29	1.0	8.6	47	1.1
13	13	28	0.98	8.6	42	0.98
14	12	28	0.91	8.1	29	0.63
15	12	28	0.91	8.1	23	0.50
16	11	27	0.80	7.8	---	---
17	10	69	1.9	7.2	---	---
18	9.5	79	2.0	7.0	---	---
19	9.0	85	2.1	6.8	---	---
20	8.6	114	2.6	6.6	---	---
21	8.6	86	2.0	6.4	---	---
22	8.4	67	1.5	6.2	---	---
23	11	36	1.1	6.0	---	---
24	11	42	1.2	5.9	---	---
25	11	43	1.3	5.8	---	---
26	11	32	0.95	5.7	---	---
27	11	36	1.1	5.6	---	---
28	11	19	0.56	5.4	---	---
29	10	45	1.2	5.3	---	---
30	10	50	1.4	5.2	---	---
31	---	---	---	5.0	---	---
TOTAL	385.1	---	40.06	234.8	---	19.52

04096326 SOAP CREEK AT ELY ROAD NEAR LITCHFIELD, MI

LOCATION.--Lat 42°04'07", long 84°50'04", in NW¼ NE¼ sec.1, T.5 S., R.5 W., Branch County, Hydrologic Unit 04050001, at bridge on Ely Road, 4.3 mi (6.9 km) west of Litchfield.

DRAINAGE AREA.--13.1 mi² (33.9 km²).

PERIOD OF RECORD.--Water years 1974 to May 1977 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)
DEC 15...	1345	560	7.6	2.0	10	13.9	320	81	85	25	4.6

DATE	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
DEC 15...	3	.1	1.2	285	0	234	11	78	13	.1

DATE	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)
DEC 15...	10	375	358	.51	.04	.01	.03	1	0	<10

DATE	TOTAL COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)
DEC 15...	0	0	40	2	50	<.5	1	0	4	10

STREAMS TRIBUTARY TO LAKE MICHIGAN

04096326 SOAP CREEK AT ELY ROAD NEAR LITCHFIELD, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITRITE (NO2) (MG/L)
OCT												
13...	1110	5.0	580	7.6	13.5	--	.02	.01	.00	.01	.01	.03
29...	1105	4.1	580	7.7	5.0	--	.01	.01	.00	.01	.01	.03
FEB												
02...	0935	3.0	590	6.9	1.5	10.7	.06	.06	.27	.03	.02	.07
24...	1410	17	495	7.8	2.0	8.3	1.1	1.2	5.2	.03	.02	.07
MAR												
04...	1125	19	510	7.8	3.5	--	1.1	.98	4.3	.03	.02	.07
APR												
11...	1005	18	585	7.9	10.0	10.6	.83	.82	3.6	.01	.02	.07
MAY												
11...	1120	11	605	7.8	13.5	8.2	.45	.45	2.0	.01	.01	.03

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)	TOTAL NITROGEN (NO3) (MG/L)
OCT												
13...	.03	.02	.02	.03	.04	.36	.22	.38	.25	.41	.27	1.8
29...	.02	.02	.05	.01	.01	.33	.29	.38	.30	.40	.32	1.8
FEB												
02...	.09	.08	.16	.16	.21	.73	.50	.89	.66	.98	.74	4.3
24...	1.1	1.2	.29	.25	.32	.68	.85	.97	1.1	2.1	2.3	9.2
MAR												
04...	1.1	1.0	.15	.11	.14	.70	.71	.85	.82	2.0	1.8	8.6
APR												
11...	.84	.84	.05	.01	.01	.75	.39	.80	.40	1.6	1.2	7.3
MAY												
11...	.46	.46	.08	.06	.08	--	.50	--	.56	--	1.0	--

DATE	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL HYDROLYZABLE PHOSPHORUS (P) (MG/L)	DIS. HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DIS. ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
OCT											
13...	.04	.03	.03	.01	.03	--	--	.04	.02	.00	.00
29...	.05	.04	.03	.01	.03	--	--	.03	.02	.00	.01
FEB											
02...	.03	.03	.01	.01	.03	--	--	--	--	--	--
24...	.06	.04	.03	.03	.09	--	--	--	--	--	--
MAR											
04...	.04	.02	.02	.01	.03	.01	.00	.03	.01	.01	.01
APR											
11...	.03	.03	.01	.01	.03	--	--	--	--	--	--
MAY											
11...	.01	.00	.00	.00	.00	--	--	--	--	--	--

04096326 SOAP CREEK AT ELY ROAD NEAR LITCHFIELD, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	TEMPERATURE (DEG C)	TOTAL ORGANIC CARBON (C) (MG/L)	TOTAL PCB (UG/L)	POLYCHLORINATED NAPHTHALENES (UG/L)	TOTAL ALDRIN (UG/L)	TOTAL CHLORDANE (UG/L)	TOTAL DDD (UG/L)	TOTAL DDE (UG/L)
NOV									
09...	1140	3.5	7.4	.0	.00	.00	.0	.00	.00

DATE	TOTAL DDT (UG/L)	TOTAL DIAZINON (UG/L)	TOTAL DIELDRIN (UG/L)	TOTAL ENDRIN (UG/L)	TOTAL ETHION (UG/L)	TOTAL HEPTACHLOR (UG/L)	TOTAL HEPTACHLOR EPOXIDE (UG/L)	TOTAL LINDANE (UG/L)	TOTAL MALATHION (UG/L)
NOV									
09...	.00	.00	.00	.00	.00	.00	.00	.00	.00

DATE	TOTAL METHOXYCHLOR (UG/L)	TOTAL METHYL PARATHION (UG/L)	TOTAL METHYL TRITHION (UG/L)	TOTAL PARATHION (UG/L)	TOTAL TOXAPHENE (UG/L)	TOTAL TRITHION (UG/L)	TOTAL 2,4-D (UG/L)	TOTAL 2,4,5-T (UG/L)	TOTAL SILVEX (UG/L)
NOV									
09...	.00	.00	.00	.00	0	.00	.00	.00	.00

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	SUSPENDED SEDIMENT (MG/L)	SUSPENDED SEDIMENT DISCHARGE (T/DAY)
OCT					
13...	1110	5.0	13.5	6	.08
29...	1105	4.1	5.0	17	.19
FEB					
02...	0935	3.0	1.5	1	.01
24...	1410	17	2.0	7	.32
MAR					
04...	1125	19	3.5	2	.10
APR					
11...	1005	18	10.0	25	1.2
MAY					
11...	1120	11	13.5	22	.65

04096340 ST. JOSEPH RIVER AT CLARENDON, MI

LOCATION.--Lat 42°07'51", long 84°51'56", in SW¼ SW¼ sec.11, T.4 S., R.5 W., Calhoun County, Hydrologic Unit 04050001, on left bank 5 ft (2 m) upstream from bridge on 22 Mile Road at Clarendon, 0.4 mi (0.6 km) upstream from Andrus drain, and at mile 171 (275 km).

DRAINAGE AREA.--144 mi² (373 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1974 to September 1977 (discontinued as a continuous-record station; converted to a crest-stage partial-record station).

GAGE.--Water-stage recorder. Altitude of gage is 960 ft (293 m) from topographic map (nearest 10 ft).

REMARKS.--Water-discharge records good except those for the winter period, which are fair.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 810 ft³/s (22.9 m³/s) Mar. 7, 1976, gage height, 7.64 ft (2.329 m); minimum, 14 ft³/s (0.40 m³/s) Aug. 5, 1977, gage height, 3.57 ft (1.088 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 332 ft³/s (9.40 m³/s) Apr. 2, gage height, 6.34 ft (1.932 m); minimum, 14 ft³/s (0.40 m³/s) Aug. 5, gage height, 3.57 ft (1.088 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	37	55	79	34	27	155	311	152	43	48	20	28
2	36	53	71	31	27	150	326	147	45	46	17	30
3	35	51	57	31	27	150	323	137	44	39	16	31
4	34	50	52	30	27	180	314	132	41	37	15	30
5	33	48	47	29	27	200	308	130	43	40	15	29
6	50	46	43	29	27	220	293	126	51	37	16	28
7	71	46	40	28	27	240	275	122	51	32	20	27
8	67	45	39	28	28	270	257	115	48	28	31	25
9	57	44	38	28	28	290	242	107	56	26	32	24
10	52	45	38	28	28	290	226	101	62	25	37	23
11	48	56	38	28	28	280	213	97	60	23	42	23
12	46	54	38	28	29	255	196	93	58	23	42	22
13	45	49	38	28	29	240	180	89	55	24	38	30
14	43	47	38	28	30	231	169	84	53	22	34	38
15	43	44	38	28	30	223	159	81	49	21	30	41
16	41	43	38	28	31	213	150	76	44	22	28	45
17	40	43	38	28	31	202	144	73	41	24	27	46
18	40	42	38	28	32	196	139	76	41	25	25	45
19	40	42	38	28	34	184	135	79	38	25	23	50
20	43	42	38	27	36	179	133	76	35	25	22	52
21	45	41	38	27	40	174	127	69	32	24	25	49
22	47	43	38	27	50	173	130	63	31	29	32	45
23	48	48	38	27	65	171	152	60	30	29	30	41
24	51	48	38	27	90	167	168	58	29	25	33	43
25	52	44	38	27	130	162	179	56	28	26	31	57
26	51	48	38	27	145	158	182	52	29	22	28	77
27	49	66	38	27	155	158	175	51	28	20	26	99
28	48	77	37	27	160	193	169	49	26	19	25	97
29	46	66	37	27	---	245	167	47	28	17	28	86
30	46	75	36	27	---	270	161	45	33	19	30	80
31	52	---	35	27	---	293	---	44	---	20	28	---
TOTAL	1436	1503	1295	874	1418	6512	6103	2687	1252	842	846	1341
MEAN	46.3	50.1	41.8	28.2	50.6	210	203	86.7	41.7	27.2	27.3	44.7
MAX	71	77	79	34	160	293	326	152	62	48	42	99
MIN	33	41	35	27	27	150	127	44	26	17	15	22
CFSM	.32	.35	.29	.20	.35	1.46	1.41	.60	.29	.19	.19	.31
IN.	.37	.39	.33	.23	.37	1.68	1.58	.69	.32	.22	.22	.35

CAL YR 1976 TOTAL 52567 MEAN 144 MAX 800 MIN 29 CFSM 1.00 IN 13.58
WTR YR 1977 TOTAL 26109 MEAN 71.5 MAX 326 MIN 15 CFSM .50 IN 6.74

04096340 ST. JOSEPH RIVER AT CLARENDON, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1974 to May 1977 (discontinued).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: July 1974 to September 1976.
SUSPENDED SEDIMENT DISCHARGE: July 1974 to May 1977.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SEDIMENT CONCENTRATIONS: Maximum daily mean, 130 mg/L July 23, 1976; minimum daily mean, 1 mg/L on many days during 1974-77.

SEDIMENT DISCHARGES: Maximum daily, 23 tons (21 tonnes) Mar. 3, July 23, 1976; minimum daily, 0.10 ton (0.09 tonne) Dec. 10, 11, 1976.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATIONS: Maximum daily mean, 26 mg/L Apr. 19; minimum daily mean, 1 mg/L Oct. 26, 27, Nov. 9-12, Dec. 10, 11, Mar. 8.
SEDIMENT DISCHARGES: Maximum daily, 10 tons (9 tonnes) Apr. 30; minimum daily, 0.10 ton (0.09 tonne) Dec. 10, 11.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)
DEC 15...	1230	620	7.3	1.5	16	13.6	310	62	81	25	20

DATE	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
DEC 15...	12	.5	1.9	297	0	244	24	54	40	.2

DATE	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CADMIUM (CD) (UG/L)	TOTAL CHROMIUM (CR) (UG/L)
DEC 15...	8.4	400	385	.54	1.7	.07	.21	1	0	<10

DATE	TOTAL COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DISSOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELENIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)
DEC 15...	0	0	40	3	60	<.5	4	0	0	10

04096340 ST. JOSEPH RIVER AT CLARENDON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	DISSOLVED NITRATE (N) (MG/L)	DISSOLVED NITRATE (NO3) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE (N) (MG/L)	DISSOLVED NITRITE (NO2) (MG/L)
OCT												
13...	0940	45	625	7.7	12.5	--	1.2	1.2	5.3	.01	.03	.10
29...	0955	48	615	7.8	3.0	--	1.4	1.3	5.8	.02	.02	.07
DEC												
07...	1040	43	600	7.4	.5	--	1.6	1.7	7.5	.02	.04	.13
JAN												
06...	1020	29	625	7.3	.5	7.9	1.6	1.6	7.0	.03	.03	.10
FEB												
09...	1055	30	650	6.9	1.0	10.5	1.4	1.4	6.1	.02	.03	.10
25...	1250	151	430	7.4	.5	10.0	1.3	1.4	6.0	.04	.04	.13
MAR												
15...	1025	225	465	7.5	6.5	8.0	.91	.92	4.1	.03	.02	.07
APR												
07...	1340	253	490	7.7	5.5	11.3	.67	.67	3.0	.01	.01	.03
MAY												
11...	1025	98	550	7.9	12.5	8.0	1.1	1.1	4.8	.03	.02	.07

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA NITROGEN (N) (MG/L)	DISSOLVED AMMONIA (NH4) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	DISSOLVED ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	DISSOLVED KJEL. NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	NITROGEN DISSOLVED AS N (MG/L)	TOTAL NITROGEN (NO3) (MG/L)
OCT												
13...	1.2	1.2	.01	.01	.01	.37	.29	.38	.30	1.6	1.5	7.0
29...	1.4	1.3	.02	.01	.01	.36	.29	.38	.30	1.8	1.6	7.9
DEC												
07...	1.6	1.7	.25	.25	.32	--	.40	--	.65	--	2.4	--
JAN												
06...	1.6	1.6	.38	.37	.48	.35	.28	.73	.65	2.3	2.3	10
FEB												
09...	1.4	1.4	.63	.63	.81	.77	.17	1.4	.80	2.8	2.2	12
25...	1.3	1.4	.47	.43	.55	1.0	.97	1.5	1.4	2.8	2.8	12
MAR												
15...	.94	.94	.05	.05	.06	.67	.57	.72	.62	1.7	1.6	7.3
APR												
07...	.68	.68	.01	.00	.00	1.2	.70	1.2	.70	1.9	1.4	8.3
MAY												
11...	1.1	1.1	.06	.04	.05	.67	.60	.73	.64	1.8	1.7	8.1

DATE	TOTAL PHOSPHORUS (P) (MG/L)	DISSOLVED PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	TOTAL HYDROLYZABLE PHOSPHORUS (P) (MG/L)	DIS. HYDROLYZABLE PHOSPHORUS (P) (MG/L)	TOTAL ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	DIS. ORTHO + HYDRO. PHOSPHORUS (P) (MG/L)	TOTAL ORGANIC PHOSPHORUS (P) (MG/L)	DISSOLVED ORGANIC PHOSPHORUS (P) (MG/L)
OCT											
13...	.11	.07	.07	.04	.12	--	--	.08	.05	.00	.00
29...	.08	.07	.03	.03	.09	--	--	.05	.05	.03	.00
DEC											
07...	.07	.06	.06	.05	.15	.01	.02	.09	.07	.00	.00
JAN											
06...	.10	.08	.09	.07	.21	--	--	--	--	--	--
FEB											
09...	.16	.10	.12	.09	.28	--	--	--	--	--	--
25...	.20	.09	.16	.09	.28	.01	.05	.17	.14	.03	--
MAR											
15...	.05	.03	.03	.03	.09	.02	.01	.05	.04	.00	--
APR											
07...	.03	.03	.01	.01	.03	--	--	--	--	--	--
MAY											
11...	.11	.04	.04	.03	.09	--	--	--	--	--	--

04096340 ST. JOSEPH RIVER AT CLARENDON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	TOTAL ORGANIC CARBON (C) (MG/L)	TOTAL PCB (UG/L)	PCB IN BOTTOM MATERIAL (UG/KG)	TOTAL ALDRIN (UG/L)	ALDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL CHLORDANE (UG/L)	CHLORDANE IN BOTTOM MATERIAL (UG/KG)
NOV 04...	1015	44	1.5	5.4	.0	4	.00	.0	.0	0

DATE	TOTAL DDD (UG/L)	DDD IN BOTTOM MATERIAL (UG/KG)	TOTAL DDE (UG/L)	DDE IN BOTTOM MATERIAL (UG/KG)	TOTAL DDT (UG/L)	DDT IN BOTTOM MATERIAL (UG/KG)	TOTAL DIAZINON (UG/L)	DIAZINON IN BOTTOM MATERIAL (UG/KG)	TOTAL DIELDRIN (UG/L)	DIELDRIN IN BOTTOM MATERIAL (UG/KG)
NOV 09...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0

DATE	TOTAL ENDRIN (UG/L)	ENDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ETHION (UG/L)	ETHION IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR (UG/L)	HEPTACHLOR IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR EPOXIDE (UG/L)	HEPTACHLOR EPOXIDE IN BOTTOM MATERIAL (UG/KG)	TOTAL LINDANE (UG/L)	LINDANE IN BOTTOM MATERIAL (UG/KG)
NOV 09...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0

DATE	TOTAL MALATHION (UG/L)	MALATHION IN BOTTOM MATERIAL (UG/KG)	TOTAL METHOXYCHLOR (UG/L)	METHOXYCHLOR IN BOTTOM MATERIAL (UG/KG)	TOTAL METHYL PARATHION (UG/L)	METHYL PARATHION IN BOTTOM MATERIAL (UG/KG)	TOTAL METHYL TRITHION (UG/L)	METHYL TRITHION IN BOTTOM MATERIAL (UG/KG)	TOTAL PARATHION (UG/L)	PARATHION IN BOTTOM MATERIAL (UG/KG)
NOV 09...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0

DATE	TOTAL TOXAPHENE (UG/L)	TOXAPHENE IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	TRITHION IN BOTTOM MATERIAL (UG/KG)	TOTAL 2,4-D (UG/L)	2,4-D IN BOTTOM MATERIAL (UG/KG)	TOTAL 2,4,5-T (UG/L)	2,4,5-T IN BOTTOM MATERIAL (UG/KG)	TOTAL SILVEX (UG/L)	SILVEX IN BOTTOM MATERIAL (UG/KG)
NOV 09...	0	0	.00	.0	.00	0	.00	0	.00	0

04096340 ST. JOSEPH RIVER AT CLARENDON, MI--CONTINUED

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
		OCTOBER			NOVEMBER			DECEMBER	
1	37	2	0.20	55	2	0.30	79	4	0.85
2	36	16	1.6	53	2	0.29	71	5	0.96
3	35	3	0.28	51	2	0.28	57	3	0.46
4	34	4	0.37	50	4	0.54	52	2	0.28
5	33	10	0.89	48	4	0.52	47	3	0.38
6	50	16	2.2	48	3	0.39	43	3	0.35
7	71	19	3.6	46	2	0.25	40	3	0.32
8	67	2	0.36	45	2	0.24	39	4	0.42
9	57	2	0.31	44	1	0.12	38	4	0.41
10	52	2	0.28	45	1	0.12	38	1	0.10
11	48	4	0.52	56	1	0.15	38	1	0.10
12	46	6	0.75	54	1	0.15	38	5	0.51
13	45	10	1.2	49	8	1.1	38	3	0.31
14	43	4	0.46	47	6	0.76	38	4	0.41
15	43	5	0.58	44	4	0.48	38	2	0.21
16	41	3	0.33	43	6	0.70	38	3	0.31
17	40	3	0.32	43	8	0.93	38	2	0.21
18	40	5	0.54	42	6	0.68	38	2	0.21
19	40	5	0.54	42	6	0.68	38	7	0.72
20	43	7	0.81	42	5	0.57	38	2	0.21
21	45	6	0.73	41	5	0.55	38	8	0.82
22	47	6	0.76	43	17	2.0	38	10	1.0
23	48	8	1.0	48	5	0.65	38	14	1.4
24	51	10	1.4	48	7	0.91	38	9	0.92
25	52	2	0.28	44	5	0.59	38	19	1.9
26	51	1	0.14	48	4	0.52	38	22	2.3
27	49	1	0.13	66	7	1.2	38	17	1.7
28	48	2	0.26	77	5	1.0	37	10	1.0
29	46	3	0.37	66	3	0.53	37	10	1.0
30	46	3	0.37	75	4	0.81	36	5	0.49
31	52	2	0.28	---	---	---	35	5	0.47
TOTAL	1436	---	21.86	1503	---	18.01	1295	---	20.73

DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
		JANUARY			FEBRUARY			MARCH	
1	34	5	0.46	27	7	0.51	155	3	1.3
2	33	7	0.62	27	7	0.51	150	6	2.4
3	31	2	0.17	27	7	0.51	150	5	2.0
4	30	2	0.16	27	7	0.51	180	10	4.9
5	29	2	0.16	27	8	0.58	200	11	5.9
6	29	3	0.23	27	8	0.58	220	5	3.0
7	28	3	0.23	27	8	0.58	240	3	1.9
8	28	3	0.23	28	8	0.60	270	1	0.73
9	28	3	0.23	28	8	0.60	290	4	3.1
10	28	3	0.23	28	6	0.45	290	7	5.5
11	28	2	0.15	28	7	0.53	280	6	4.5
12	28	5	0.38	29	5	0.39	255	7	4.8
13	28	5	0.38	29	3	0.23	240	6	3.9
14	28	8	0.60	30	3	0.24	231	8	5.0
15	28	4	0.30	30	4	0.32	223	8	4.8
16	28	8	0.60	31	5	0.42	213	9	5.2
17	28	7	0.53	31	6	0.50	202	8	4.4
18	28	7	0.53	32	6	0.52	196	7	3.7
19	28	5	0.38	34	7	0.64	184	5	2.5
20	27	5	0.36	36	8	0.78	179	6	2.9
21	27	8	0.58	40	6	0.65	174	8	3.8
22	27	6	0.44	50	5	0.68	173	6	2.8
23	27	5	0.36	65	6	1.1	171	10	4.6
24	27	4	0.29	90	10	2.4	167	10	4.5
25	27	5	0.36	130	7	2.5	162	6	2.6
26	27	4	0.29	145	7	2.7	158	12	5.1
27	27	6	0.44	155	6	2.5	158	6	2.6
28	27	6	0.44	160	3	1.3	193	5	2.6
29	27	6	0.44	---	---	---	245	6	4.0
30	27	6	0.44	---	---	---	270	6	4.4
31	27	6	0.44	---	---	---	293	5	4.0
TAL	874	---	11.45	1418	---	23.83	6512	---	113.43

STREAMS TRIBUTARY TO LAKE MICHIGAN

04096340 ST. JOSEPH RIVER AT CLARENDON, MI--CONTINUED

SUSPENDED-SEDIMENT DISCHARGE (TONS/DAY), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)	MEAN DISCHARGE (CFS)	MEAN CONCEN-TRATION (MG/L)	SEDIMENT DISCHARGE (TONS/DAY)
		APRIL			MAY	
1	311	4	3.4	152	20	8.2
2	326	3	2.6	147	7	2.8
3	323	4	3.5	137	7	2.6
4	314	4	3.4	132	7	2.5
5	308	2	1.7	130	7	2.5
6	293	4	3.2	126	7	2.4
7	275	3	2.2	122	6	2.0
8	257	2	1.4	115	6	1.9
9	242	7	4.6	107	6	1.7
10	226	7	4.3	101	6	1.6
11	213	7	4.0	97	6	1.6
12	196	10	5.3	93	6	1.5
13	180	12	5.8	89	6	1.4
14	169	16	7.3	84	5	1.1
15	159	19	8.2	81	5	1.1
16	150	16	6.5	76	---	---
17	144	22	8.6	73	---	---
18	139	13	4.9	76	---	---
19	135	26	9.5	79	---	---
20	133	9	3.2	76	---	---
21	127	7	2.4	69	---	---
22	130	7	2.5	63	---	---
23	152	8	3.3	60	---	---
24	168	8	3.6	58	---	---
25	179	8	3.9	56	---	---
26	182	12	5.9	52	---	---
27	175	13	6.1	51	---	---
28	169	19	8.7	49	---	---
29	167	21	9.5	47	---	---
30	161	23	10	45	---	---
31	---	---	---	44	---	---
TOTAL	6103	---	149.5	2687	---	34.9

04096400 ST. JOSEPH RIVER NEAR BURLINGTON, MI

LOCATION.--Lat 42°06'10", long 85°02'25", in SW¼ SW¼ sec.20, T.4 S., R.6 W., Calhoun County, Hydrologic Unit 04050001, on right bank 10 ft (3 m) upstream from bridge on 13 Mile Rd., 2.0 mi (3.2 km) east of Burlington, 4.0 mi (6.4 km) downstream from Tekonsha Creek, and at mile 164 (264 km).

DRAINAGE AREA.--201 mi² (521 km²).

PERIOD OF RECORD.--October 1962 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 920 ft (280 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period and those for the period of no gage-height record, July 10 to Aug. 7, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--15 years, 157 ft³/s (4.446 m³/s), 10.61 in/yr (269 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,030 ft³/s (29.2 m³/s), Mar. 6, 1976, gage height, 5.31 ft (1.618 m); maximum gage height, 5.51 ft (1.679 m) Feb. 5, 1968; minimum discharge, 8.0 ft³/s (0.23 m³/s) Aug. 9, 10, 11, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 415 ft³/s (11.8 m³/s), Apr. 3, gage height, 4.08 ft (1.244 m); minimum daily discharge, 21 ft³/s (0.59 m³/s) Aug. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	46	55	110	44	33	206	371	207	55	56	28	42
2	45	65	95	42	34	203	342	207	56	57	25	45
3	44	64	80	40	34	185	413	197	56	54	22	46
4	42	62	72	38	34	245	403	186	54	48	21	44
5	41	60	66	37	34	289	404	182	55	47	22	43
6	56	59	58	35	34	287	393	175	60	47	28	41
7	71	55	52	34	34	294	363	168	64	44	35	39
8	80	50	50	34	34	315	338	159	62	40	39	38
9	76	50	48	34	34	371	310	150	66	36	42	37
10	67	50	48	34	34	378	289	142	72	34	53	36
11	63	57	46	34	35	366	271	137	77	33	57	34
12	57	59	48	34	35	346	252	130	77	32	59	33
13	54	64	44	34	35	330	237	126	75	32	52	37
14	53	63	44	34	36	313	223	121	70	32	48	46
15	51	59	44	34	36	296	210	116	64	31	43	50
16	49	56	44	34	37	279	198	110	59	32	41	60
17	48	55	44	34	38	265	192	104	54	33	39	62
18	48	53	44	33	40	261	187	110	51	34	38	65
19	49	54	44	33	42	252	180	108	50	34	37	69
20	51	53	50	33	45	250	180	106	48	34	37	70
21	53	53	50	33	50	243	183	99	45	34	42	68
22	54	53	50	33	60	244	185	90	42	34	49	62
23	55	53	50	33	90	238	213	82	41	35	47	58
24	58	54	50	33	130	236	225	77	39	34	48	68
25	60	54	50	33	163	229	234	74	40	35	46	74
26	60	55	50	33	171	226	247	69	38	33	44	134
27	59	49	50	33	192	229	234	65	38	30	41	156
28	54	47	49	33	207	262	232	61	37	27	38	149
29	47	49	48	33	---	378	227	60	40	25	42	136
30	45	100	46	33	---	342	219	58	44	28	45	123
31	44	---	45	33	---	374	---	56	---	29	42	---
TOTAL	1734	1906	1697	1072	1779	8802	8013	3732	1629	1134	1250	1965
MEAN	55.9	63.5	54.7	34.6	63.6	284	267	120	54.3	36.6	40.3	65.5
MAX	80	100	110	44	207	342	413	207	77	57	59	156
MIN	41	53	45	33	33	185	180	56	37	25	21	33
CFSM	.28	.32	.27	.17	.32	1.41	1.33	.60	.27	.18	.20	.33
IN.	.32	.33	.31	.20	.33	1.63	1.49	.69	.30	.21	.23	.36

CAL YR 1976 TOTAL 71569 MEAN 196 MAX 1020 MIN 35 CFSM .97 IN 13.23
WTR YR 1977 TOTAL 34709 MEAN 95.1 MAX 413 MIN 21 CFSM .47 IN 6.42

04096515 HOG CREEK NEAR ALLEN, MI

LOCATION.--Lat 41°56'59", long 84°49'40", in NE¼ SE¼ sec.13, T.6 S., R.5 W., Branch County, Hydrologic Unit 04050001, on left bank 12 ft (4 m) downstream from bridge on U.S. Highway 12, 1.0 mi (1.6 km) downstream from Little Hog Creek, and 3.1 mi (5.0 km) west of Allen.

DRAINAGE AREA.--48.7 mi² (126.1 km²).

PERIOD OF RECORD.--October 1969 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,010 ft (308 m) from topographic map. Prior to May 23, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--8 years, 39.9 ft³/s (1.130 m³/s), 11.13 in/yr (283 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 304 ft³/s (8.61 m³/s) Mar. 5, 1976, gage height, 5.33 ft (1.625 m); maximum gage height, 5.73 ft (1.747 m) Feb. 20, 1971 (backwater from ice); minimum discharge, 1.2 ft³/s (0.034 m³/s) Aug. 20, 21, 1971; minimum gage height, 1.34 ft (0.408 m) Sept. 12, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 237 ft³/s (6.71 m³/s) Mar. 6, gage height, 4.81 ft (1.466 m); minimum, 3.0 ft³/s (0.085 m³/s) Aug. 5; minimum gage height, 1.34 ft (0.408 m) Sept. 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.8	9.0	11	7.5	7.0	131	124	45	8.2	15	3.4	4.6
2	4.7	8.2	10	7.5	7.0	116	121	41	8.5	11	3.3	5.9
3	4.6	7.9	10	7.5	7.0	104	119	39	9.3	9.2	3.2	5.6
4	4.5	7.7	9.4	7.5	7.0	136	114	37	8.7	9.4	3.2	4.6
5	4.7	7.5	9.5	7.5	7.0	200	104	36	8.4	9.2	3.1	4.5
6	13	7.3	9.0	7.5	7.0	232	104	34	10	7.7	3.1	4.3
7	15	7.2	9.0	7.5	7.0	217	97	37	8.8	6.7	4.4	4.1
8	10	7.3	9.0	7.0	7.0	188	84	32	9.6	6.3	4.3	4.1
9	8.7	6.9	8.5	7.0	7.0	144	74	29	22	5.9	4.0	4.0
10	8.1	7.4	8.5	7.0	7.1	115	71	26	14	5.3	6.5	3.9
11	7.7	8.0	8.5	7.0	7.0	102	65	24	17	4.8	7.7	3.6
12	7.2	7.8	8.0	7.0	7.5	93	59	22	17	5.4	7.6	3.5
13	7.0	7.9	8.0	7.0	8.5	87	53	21	15	5.8	6.6	5.7
14	6.6	7.0	8.0	7.0	9.0	85	49	20	14	4.9	5.8	7.7
15	6.2	9.1	8.0	7.0	8.4	78	44	18	12	4.5	5.1	6.3
16	5.8	8.4	8.0	7.0	8.0	69	40	17	11	5.3	4.7	8.7
17	5.7	7.0	8.0	7.0	9.0	59	39	16	14	5.9	4.7	8.1
18	5.4	6.2	8.0	7.0	8.5	54	37	19	14	6.1	4.4	8.6
19	5.7	6.6	8.0	7.0	8.0	52	35	21	11	6.7	4.1	10
20	6.9	6.7	8.5	7.0	9.0	53	34	18	9.9	5.7	4.0	10
21	6.9	6.5	9.0	7.0	8.0	52	33	17	9.0	5.4	4.5	8.5
22	7.3	7.4	9.4	7.0	9.0	53	41	15	7.9	7.1	5.3	7.4
23	7.3	7.8	9.4	7.0	20	53	65	14	7.2	5.9	4.8	6.6
24	8.3	7.3	9.4	7.0	80	50	64	13	6.7	5.1	5.0	14
25	8.3	7.5	9.0	7.0	140	47	63	12	7.3	5.8	4.6	25
26	7.7	12	9.0	7.0	160	45	58	11	6.6	5.2	4.2	33
27	7.3	22	9.0	7.0	155	43	53	10	6.0	4.3	4.0	34
28	6.9	18	8.5	7.0	150	79	53	9.4	5.9	3.7	3.9	25
29	6.9	13	8.0	7.0	---	121	56	8.6	7.7	3.7	5.2	18
30	7.6	12	8.0	7.0	---	149	50	8.6	9.6	4.3	5.2	15
31	11	---	8.0	7.0	---	145	---	8.9	---	3.9	4.6	---
TOTAL	227.6	264.7	272.0	220.5	876.3	3158	2026	682.5	318.4	195.2	144.5	304.3
MEAN	7.34	8.82	8.77	7.11	31.3	102	67.5	22.0	10.6	6.30	4.66	10.1
MAX	15	22	11	7.5	160	232	129	45	22	15	7.7	34
MIN	4.5	6.2	8.0	7.0	7.0	43	33	8.6	5.9	3.7	3.1	3.5
CFSM	.15	.18	.18	.15	.64	2.09	1.39	.45	.22	.13	.10	.21
IN.	.17	.20	.21	.17	.67	2.41	1.55	.52	.24	.15	.11	.23

CAL YR 1976 TOTAL 15821.9 MEAN 43.2 MAX 301 MIN 3.7 CFSM .89 IN 12.09
WTR YR 1977 TOTAL 8690.0 MEAN 23.8 MAX 232 MIN 3.1 CFSM .49 IN 6.64

04096600 COLDWATER RIVER NEAR HODUNK, MI

LOCATION.--Lat 42°01'45", long 85°06'25", in NW¼ NE¼ sec.22, T.5 S., R.7 W., Branch County, Hydrologic Unit 04050001, on downstream side of bridge on Girard Rd., 2.5 mi (4.0 km) northwest of Hodunk, and 3.5 mi (5.6 km) upstream from mouth.

DRAINAGE AREA.--293 mi² (759 km²).

PERIOD OF RECORD.--October 1962 to current year.

REVISED RECORDS.--WDR MI-76-1: 1974.

GAGE.--Water-stage recorder. Altitude of gage is 900 ft (274 m) from topographic map (nearest 10 ft). Prior to July 26, 1963, non-recording gage and crest-stage gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation caused by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--15 years, 226 ft³/s (6.400 m³/s), 10.47 in/yr (266 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,230 ft³/s (63.2 m³/s) Mar. 8, 9, 1974, gage height, 7.69 ft (2.344 m); minimum, 6.2 ft³/s (0.18 m³/s) Sept. 26, 1964; minimum gage height, 2.28 ft (0.695 m) Oct. 4-14, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 629 ft³/s (17.8 m³/s) Mar. 30, gage height, 5.03 ft (1.533 m); minimum, 19 ft³/s (0.54 m³/s) Aug. 4, gage height, 2.39 ft (0.728 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	68	122	95	59	54	202	574	184	57	96	27	40
2	64	130	88	58	55	202	578	179	59	97	24	50
3	61	125	86	58	54	204	561	182	60	86	23	49
4	59	122	85	58	54	242	550	184	57	78	21	45
5	59	109	85	58	54	377	538	191	61	81	23	42
6	77	32	85	59	54	455	532	199	65	70	22	42
7	88	30	84	60	54	461	518	198	64	61	43	43
8	84	34	84	59	54	461	485	186	64	57	53	56
9	77	34	84	58	54	312	459	176	74	54	48	51
10	71	35	84	58	54	504	430	166	82	50	57	45
11	66	36	82	59	54	461	404	160	81	46	57	43
12	64	34	80	60	54	434	381	154	80	47	69	40
13	64	53	80	60	54	416	357	151	78	47	102	61
14	53	41	80	58	54	409	292	146	75	48	95	146
15	34	48	78	58	54	398	149	141	70	46	90	144
16	33	85	76	58	54	376	141	134	67	46	86	145
17	33	85	76	58	54	363	141	130	65	62	82	111
18	34	83	73	58	55	370	143	132	63	63	68	61
19	34	79	72	58	54	407	143	127	63	54	33	64
20	38	76	70	58	58	391	151	125	60	35	31	65
21	52	96	70	58	58	386	170	123	56	36	35	65
22	74	135	68	58	58	380	176	118	54	42	44	66
23	77	120	68	58	65	386	283	114	49	39	40	66
24	91	111	68	58	100	375	364	111	36	36	45	125
25	124	106	67	58	172	364	356	96	38	35	42	200
26	125	110	68	58	205	355	285	67	37	32	39	313
27	121	124	72	58	205	344	194	65	35	29	37	382
28	118	127	69	58	209	416	191	64	34	28	35	354
29	116	117	69	58	---	332	194	62	42	26	40	320
30	120	103	69	58	---	618	192	61	54	26	41	288
31	121	---	69	58	---	598	---	59	---	29	39	---
TOTAL	2295	2642	2351	1824	2233	12445	9936	4185	1780	1582	1491	3522
MEAN	74.0	88.1	75.8	58.8	79.8	401	331	135	59.3	51.0	48.1	117
MAX	125	135	95	60	209	618	578	199	82	97	102	382
MIN	33	30	68	58	58	202	141	59	34	26	21	40
CFSM	.25	.30	.26	.20	.27	1.37	1.13	.46	.20	.17	.16	.40
IN.	.29	.34	.30	.23	.28	1.58	1.26	.53	.23	.20	.19	.45

CAL YR 1976 TOTAL 105203 MEAN 287 MAX 1710 MIN 28 CFSM .98 IN 13.36
WTR YR 1977 TOTAL 46286 MEAN 127 MAX 618 MIN 21 CFSM .43 IN 5.88

04096900 NOTTAWA CREEK NEAR ATHENS, MI

LOCATION.--Lat 42°03'20", long 85°18'30", in NW¼ sec.12, T.5 S., R.9 W., St. Joseph County, Hydrologic Unit 04050001, on right bank at downstream side of bridge on Shorts Road, 4.2 mi (6.8 km) southwest of Athens, and 5.0 mi (8.0 km) downstream from Pine Creek.

DRAINAGE AREA.--162 mi² (420 km²).

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (259 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--11 years, 142 ft³/s (4.021 m³/s), 11.90 in/yr (302 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 808 ft³/s (22.9 m³/s) Mar. 6, 1976, gage height, 4.46 ft (1.359 m); maximum gage height, 4.66 ft (1.420 m) Feb. 3, 1968; minimum discharge, 21 ft³/s (0.59 m³/s) July 28, 29, 30, Aug. 4, 6, 1977; minimum gage height, 0.37 ft (0.113 m) Oct. 16, 18, 20, 21, Nov. 8, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 343 ft³/s (9.71 m³/s) Mar. 30, gage height, 2.80 ft (0.853 m); minimum, 21 ft³/s (0.59 m³/s) July 28, 29, 30, Aug. 4, 6; minimum gage height, 0.53 ft (0.162 m) Nov. 16, 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	43	54	80	52	47	149	298	162	59	70	25	47
2	43	56	70	52	47	121	263	149	60	73	24	53
3	44	55	66	52	47	105	255	141	59	69	24	55
4	44	54	63	52	47	170	255	127	57	61	23	51
5	45	53	61	52	47	239	281	128	62	57	24	47
6	63	52	60	52	47	257	293	127	67	52	22	47
7	69	51	58	52	47	243	283	119	66	47	24	44
8	74	49	54	52	47	218	255	112	61	45	34	42
9	73	49	57	50	47	211	219	106	65	43	42	40
10	67	50	57	50	47	220	188	102	65	43	51	38
11	60	50	56	50	47	213	165	99	65	43	57	35
12	57	49	55	50	47	203	149	97	66	42	60	35
13	56	48	55	50	48	208	139	93	66	41	54	52
14	56	49	54	50	48	215	131	89	63	38	48	59
15	54	44	54	50	48	210	124	86	60	37	41	65
16	52	43	54	50	48	192	118	83	57	35	36	69
17	51	44	54	49	48	169	114	80	55	38	34	69
18	50	45	54	49	48	156	114	80	55	41	32	69
19	53	45	54	48	48	148	111	77	54	43	29	65
20	55	43	53	48	48	155	112	76	52	39	29	61
21	55	43	53	47	48	166	116	74	50	37	32	54
22	57	42	53	47	50	172	124	71	48	38	42	49
23	57	39	53	47	60	174	159	71	46	35	47	46
24	57	42	53	47	170	171	203	71	45	34	49	54
25	55	43	53	47	200	162	217	69	46	37	44	62
26	54	54	53	47	185	157	222	67	46	35	38	93
27	53	77	53	47	175	162	224	64	43	29	34	95
28	52	91	53	47	160	212	210	62	41	24	31	92
29	52	99	53	47	---	290	195	60	42	21	42	83
30	52	97	53	47	---	338	181	59	56	21	45	72
31	56	---	53	47	---	334	---	59	---	24	46	---
TOTAL	1709	1615	1757	1527	1996	6140	5720	2860	1677	1292	1163	1743
MEAN	55.1	53.8	56.7	49.3	71.3	198	191	92.3	55.9	41.7	37.5	58.1
MAX	74	99	80	52	200	338	298	162	67	73	60	95
MIN	43	39	53	47	47	105	111	59	41	21	22	35
CFSM	.34	.33	.35	.30	.44	1.22	1.18	.57	.35	.26	.23	.36
IN.	.39	.37	.40	.35	.46	1.41	1.31	.66	.39	.30	.27	.40

CAL YR 1976 TOTAL 55394 MEAN 151 MAX 794 MIN 26 CFSM .93 IN 12.72
WTR YR 1977 TOTAL 29199 MEAN 80.0 MAX 338 MIN 21 CFSM .49 IN 6.70

04097170 PORTAGE RIVER NEAR VICKSBURG, MI

LOCATION.--Lat 42°06'53", long 85°29'08", in SW¼ sec.16, T.4 S., R.10 W., Kalamazoo County, Hydrologic Unit 04050001, on right bank 15 ft (5 m) upstream from bridge on W Avenue, 2.4 mi (3.9 km) east of Vicksburg.

DRAINAGE AREA.--68.2 mi² (176.6 km²).

PERIOD OF RECORD.--March 1946 to September 1951, October 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 839.94 ft (256.014 m) above mean sea level. Mar. 13, 1946 to Sept. 30, 1951, non-recording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 60.8 ft³/s (1.722 m³/s), 12.11 in/yr (308 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 356 ft³/s (10.1 m³/s) Apr. 7, 1947, gage height, 5.66 ft (1.725 m); minimum, 9.8 ft³/s (0.28 m³/s) Aug. 2, 3, 1977, gage height, 3.04 ft (0.927 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 108 ft³/s (3.06 m³/s) Mar. 29, 30, gage height, 4.47 ft (1.362 m); maximum gage height, 4.65 ft (1.417 m) Nov. 30, backwater from ice; minimum discharge, 9.8 ft³/s (0.28 m³/s) Aug. 2, 3, gage height, 3.04 ft (0.927 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	29	33	24	21	50	99	57	23	16	10	18
2	25	29	32	24	21	56	97	59	23	15	10	20
3	25	29	30	24	21	69	97	58	22	15	10	20
4	24	30	29	23	21	89	91	56	21	15	10	19
5	25	29	28	23	21	102	93	55	23	14	10	19
6	25	29	27	23	21	101	93	55	23	14	10	19
7	24	29	26	23	21	98	87	53	22	14	10	19
8	29	29	26	23	21	95	83	52	22	14	11	19
9	30	28	25	23	21	96	76	50	22	13	11	18
10	30	29	25	23	21	97	73	48	21	13	12	18
11	29	30	25	23	21	95	70	47	21	13	12	18
12	29	29	24	23	21	94	68	46	22	13	12	18
13	29	30	24	23	21	98	65	45	21	13	12	21
14	29	29	24	22	21	99	62	43	20	13	12	22
15	28	29	24	22	21	96	60	40	19	13	12	22
16	28	29	24	22	21	93	58	39	19	13	12	23
17	27	29	24	22	21	87	56	38	19	13	12	23
18	27	29	24	22	21	85	54	37	19	12	12	24
19	27	29	24	22	21	83	53	36	18	12	12	24
20	27	29	24	22	22	84	54	35	18	12	12	24
21	27	29	24	22	23	84	54	33	17	12	12	24
22	28	29	24	22	25	87	56	32	16	12	13	23
23	28	29	24	22	30	85	60	31	15	11	13	24
24	28	29	24	22	50	83	60	29	15	11	13	25
25	29	29	24	22	70	79	61	28	16	12	13	26
26	28	31	24	21	86	77	62	27	15	12	13	32
27	28	31	24	21	85	75	60	26	14	12	13	30
28	27	31	24	21	82	89	62	25	14	11	13	29
29	27	31	24	21	---	107	62	24	14	11	17	29
30	28	31	24	21	---	106	59	24	15	11	16	28
31	29	---	24	21	---	103	---	23	---	11	16	---
TOTAL	858	910	784	692	792	2743	2087	1251	569	396	376	678
MEAN	27.7	30.3	25.3	22.3	28.3	88.5	69.6	40.4	19.0	12.8	12.1	22.6
MAX	30	31	33	24	70	107	99	59	23	16	17	32
MIN	24	28	24	21	21	50	53	23	14	11	10	18
CFSM	.41	.44	.37	.33	.42	1.30	1.02	.59	.28	.19	.18	.33
IN.	.47	.50	.43	.38	.43	1.50	1.14	.68	.31	.22	.21	.37

CAL YR 1976 TOTAL 22551 MEAN 61.8 MAX 271 MIN 18 CFSM .90 IN 12.30
WTR YR 1977 TOTAL 12140 MEAN 33.3 MAX 107 MIN 10 CFSM .49 IN 6.62

04097500 ST. JOSEPH RIVER AT THREE RIVERS, MI

LOCATION.--Lat 41°56'25", long 85°38'00", in SW¼ SE¼ sec.18, T.6 S., R.11 W., St. Joseph County, Hydrologic Unit 04050001, on right bank in Scidmore Park at Three Rivers, 250 ft (76 m) downstream from Rocky River, and at mile 112 (180 km).

DRAINAGE AREA.--1,350 mi² (3,496 km²).

PERIOD OF RECORD.--May 1953 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 781.34 ft (238.152 m) above mean sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by powerplant above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years, 1,082 ft³/s (30.64 m³/s), 10.88 in/yr (276 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,810 ft³/s (165 m³/s) Mar. 7, 1976, gage height, 9.08 ft (2.768 m); minimum daily, 78 ft³/s (2.21 m³/s) Sept. 12, 1964.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1918, 8,260 ft³/s (234 m³/s) Apr. 27, 1950, gage height, 10.6 ft (3.23 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,560 ft³/s (72.5 m³/s) Mar. 31, gage height, 5.82 ft (1.774 m); minimum, 225 ft³/s (6.32 m³/s) Aug. 3, 4, 5, gage height, 2.16 ft (0.658 m); minimum daily, 224 ft³/s (6.34 m³/s) Aug. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	462	565	644	494	490	1220	2490	1420	457	506	232	466
2	346	655	613	475	490	1200	2460	1260	466	499	230	517
3	354	645	585	475	500	1200	2440	1220	459	470	228	522
4	570	640	575	490	490	1460	2350	1210	438	480	224	499
5	520	640	534	490	490	1750	2410	1200	428	573	233	481
6	520	625	547	490	540	2010	2470	1140	456	528	244	467
7	610	570	592	490	490	2030	2380	1140	487	471	300	465
8	742	565	581	470	480	1940	2240	1110	503	443	297	410
9	645	660	583	470	610	2000	2140	1060	555	465	320	396
10	580	540	587	490	490	2100	1990	955	564	398	376	390
11	600	550	549	450	450	2100	1870	992	514	383	438	395
12	605	570	524	470	460	2140	1760	900	497	384	446	387
13	590	560	547	440	481	2170	1650	884	518	349	437	430
14	570	503	584	470	453	2100	1550	883	560	304	410	494
15	480	480	581	450	463	2000	1410	854	526	293	375	533
16	457	491	577	450	484	1850	1420	749	516	304	425	617
17	434	490	570	440	529	1650	1330	645	496	308	413	600
18	502	516	524	420	525	1730	1110	668	489	333	400	715
19	535	530	504	410	505	1640	1070	753	475	312	360	707
20	525	518	525	400	445	1590	1050	764	463	305	359	669
21	484	489	562	400	494	1710	964	679	452	307	363	602
22	493	497	550	400	535	1770	1140	667	434	304	350	544
23	484	518	602	400	564	1730	1260	643	423	309	386	530
24	480	539	541	420	715	1670	1350	623	425	283	415	580
25	480	532	518	420	1110	1750	1370	612	464	272	396	607
26	480	595	489	420	1420	1710	1500	609	431	270	372	822
27	525	702	519	420	1460	1640	1610	604	418	262	363	992
28	525	862	552	410	1130	1740	1630	581	416	258	365	1080
29	530	872	519	400	---	2100	1670	506	425	253	427	1100
30	550	694	521	400	---	2330	1600	452	450	253	459	1110
31	570	---	530	400	---	2520	---	437	---	247	430	---
TOTAL	16248	17642	17230	13725	16247	57050	51494	26300	14212	11086	11073	18127
MEAN	524	588	556	443	580	1840	1716	848	474	358	357	604
MAX	742	872	644	494	1460	2520	2490	1420	564	573	459	1110
MIN	346	480	489	400	390	1200	964	437	416	247	224	387
CFSM	.39	.44	.41	.33	.43	1.36	1.27	.63	.35	.27	.26	.45
IN.	.45	.49	.47	.38	.45	1.57	1.42	.72	.39	.31	.31	.50

CAL YR 1976 TOTAL 500839 MEAN 1368 MAX 5780 MIN 278 CFSM 1.01 IN 13.80
WTR YR 1977 TOTAL 270434 MEAN 741 MAX 2520 MIN 224 CFSM .55 IN 7.45

04097540 PRAIRIE RIVER NEAR NOTTAWA, MI

LOCATION.--Lat 41°53'18", long 85°24'34", in NW¼ SW¼ sec.6, T.7 S., R.9 W., St. Joseph County, Hydrologic Unit 04050001, on left bank 10 ft (3 m) upstream from bridge on State Highway 66, 3.0 mi (4.8 km) upstream from unnamed tributary, and 3.0 mi (4.8 km) southeast of Nottawa.

DRAINAGE AREA.--106 mi² (275 km²).

PERIOD OF RECORD.--October 1962 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (259 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--15 years, 86.9 ft³/s (2.461 m³/s), 11.13 in/yr (283 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 523 ft³/s (14.8 m³/s), Mar. 6, 1976, gage height, 5.66 ft (1.725 m); minimum, 11 ft³/s (0.31 m³/s), Aug. 9, 10, Sept. 8, 9, 10, 1964; minimum gage height, 1.77 ft (0.539 m) Aug. 9, 10, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 209 ft³/s (5.92 m³/s) Mar. 31, gage height, 4.45 ft (1.356 m); minimum, 21 ft³/s (0.59 m³/s), Aug. 3, gage height, 1.95 ft (0.594 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	37	48	53	46	40	112	205	107	48	74	23	48
2	36	48	52	46	40	118	197	103	49	76	23	53
3	34	47	51	46	40	90	184	101	48	73	22	54
4	33	47	51	45	40	121	179	98	46	68	22	53
5	34	47	51	45	46	144	161	97	44	61	22	52
6	44	47	50	45	40	176	176	101	49	54	24	49
7	55	46	50	44	40	185	170	104	50	48	31	46
8	57	45	50	44	40	179	162	110	51	43	34	44
9	55	45	50	44	40	166	153	110	56	39	36	42
10	51	45	49	43	40	156	144	105	58	36	48	41
11	48	45	43	43	42	150	136	99	60	33	54	39
12	47	44	49	43	43	150	129	93	61	35	55	38
13	45	44	44	43	44	153	122	88	61	36	52	46
14	44	43	44	42	45	154	117	84	59	37	48	50
15	42	43	47	42	46	149	116	80	57	37	45	55
16	41	42	46	42	46	141	107	76	54	35	43	62
17	41	42	46	42	46	132	104	73	53	35	42	65
18	40	42	46	41	46	131	101	71	53	37	41	68
19	42	42	46	41	46	126	99	71	50	38	39	69
20	43	42	46	41	46	129	98	70	48	39	37	70
21	45	41	46	41	46	130	98	69	45	37	38	69
22	45	41	46	41	46	137	114	67	43	34	39	67
23	45	41	46	40	60	139	139	64	40	31	39	65
24	45	40	46	40	100	138	137	62	38	30	39	70
25	45	41	46	40	140	136	133	60	36	29	38	76
26	45	45	46	40	135	132	130	57	65	28	38	92
27	45	55	46	40	130	130	125	55	67	27	37	100
28	45	60	46	40	121	153	121	53	66	25	36	104
29	44	60	46	40	---	179	118	51	69	25	41	101
30	45	56	46	40	---	198	113	50	68	24	42	97
31	48	---	46	40	---	209	---	48	---	24	42	---
TOTAL	1370	1384	1484	1310	1624	4551	4104	2477	1616	1248	1170	1885
MEAN	44.2	46.1	47.9	42.3	58.1	147	137	79.9	53.9	40.3	37.7	62.8
MAX	57	66	53	46	140	209	205	110	69	76	55	104
MIN	33	40	46	40	40	90	98	48	38	24	22	38
CFSM	.42	.44	.45	.40	.55	1.39	1.29	.75	.51	.38	.36	.59
IN.	.48	.49	.52	.46	.57	1.60	1.44	.87	.57	.44	.41	.66

CAL YR 1976 TOTAL 38804 MEAN 106 MAX 520 MIN 28 CFSM 1.00 IN 13.62
WTR YR 1977 TOTAL 24267 MEAN 66.4 MAX 209 MIN 22 CFSM .63 IN 8.50

04097970 LIME LAKE OUTLET AT PANAMA, IN

LOCATION.--Lat 41°42'46", long 85°07'10", in NW¼ NW¼ sec.35, T.38 N., R.12 E., Steuben County, Hydrologic Unit 04050001, on right bank 10 ft (3 m) downstream from dam for Lime Lake, 30 ft (9 m) upstream from bridge on Orland Road, and 0.7 mile (1.1 km) northwest of Panama.

DRAINAGE AREA.--17.5 mi² (45.3 km²), of which 3.68 mi² (9.53 km²) does not contribute directly to surface runoff.

PERIOD OF RECORD.--October 1969 to current year.

GAGE.--Water-stage recorder. Datum of gage is 950.00 ft (289.560 m) above mean sea level.

REMARKS.--Records poor. Occasional regulation by control structure for Lime Lake.

AVERAGE DISCHARGE.--8 years, 6.80 ft³/s (0.193 m³/s), 5.28 in/yr (134 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 34 ft³/s (0.96 m³/s) Mar. 5, 1976, gage height, 4.59 ft (1.399 m); no flow at times during 1971 and 1972.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 25 ft³/s (0.71 m³/s) Mar. 31, gage height, 4.48 ft (1.366 m); minimum daily discharge, 0.20 ft³/s (0.006 m³/s) Oct. 5.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.30	.48	3.6	3.8	3.1	6.2	23	9.6	.49	4.2	.82	1.8
2	.35	.48	3.6	3.7	3.0	6.0	22	9.7	.50	3.4	.84	1.8
3	.27	.47	3.6	3.7	3.2	6.3	21	9.3	.49	3.0	.89	1.8
4	.23	.47	3.8	3.6	3.3	9.4	20	8.0	.45	2.7	.96	1.8
5	.20	.46	3.9	3.6	3.4	11	18	7.0	.49	2.4	1.0	1.7
6	.45	.45	4.0	3.5	3.3	11	18	9.2	.52	2.2	1.1	1.2
7	1.1	.45	4.3	3.6	3.3	10	17	7.7	1.0	2.8	1.3	.96
8	1.0	.45	4.3	3.6	3.3	10	16	6.6	1.1	2.7	1.5	.73
9	.70	.45	4.4	3.5	3.2	11	15	5.5	1.7	2.4	1.6	.63
10	.53	.45	4.3	4.0	3.9	11	14	4.8	1.7	1.8	1.5	.59
11	.39	.44	4.3	4.0	4.4	11	14	4.0	1.8	1.2	2.1	.55
12	.26	.44	4.2	3.9	4.4	12	13	3.3	1.8	1.5	2.1	.54
13	.40	.46	4.2	3.9	4.5	13	13	2.8	1.8	1.6	2.2	.68
14	.30	.49	4.3	4.0	4.4	13	13	2.4	1.9	1.8	2.1	1.0
15	.40	.57	4.2	3.9	4.3	12	12	2.0	2.2	2.4	1.4	1.3
16	.33	.70	4.2	3.9	4.1	11	8.9	1.8	2.5	4.0	1.8	1.4
17	.35	.84	4.2	3.9	4.1	12	6.7	1.5	2.8	4.0	2.1	1.4
18	.38	1.0	4.1	3.8	3.9	14	7.0	1.7	2.9	3.5	1.6	1.8
19	.40	1.2	4.0	3.7	3.8	14	7.4	1.4	2.7	2.3	1.0	1.9
20	.47	1.4	4.2	3.6	3.7	14	7.9	1.1	2.5	2.1	.64	1.6
21	.55	1.6	4.0	3.6	3.7	14	8.0	.84	2.3	2.0	1.3	1.4
22	.64	1.6	3.9	3.5	3.6	14	9.1	.80	2.2	1.8	1.2	1.4
23	.74	1.6	3.9	3.5	3.8	14	11	.90	2.2	1.8	1.0	1.3
24	.60	1.6	3.9	3.4	5.0	13	11	.80	2.1	2.3	.86	2.3
25	.54	1.8	3.8	3.4	5.2	13	11	.73	3.8	2.1	.78	2.4
26	.52	2.8	3.8	3.5	5.5	13	11	.67	3.4	1.0	.52	2.5
27	.52	3.8	3.9	3.5	6.4	14	11	.60	2.9	.80	.60	2.4
28	.51	3.7	3.9	3.6	6.4	18	11	.55	2.8	.83	.82	2.1
29	.50	3.6	3.9	3.6	---	19	11	.50	3.0	.88	1.6	2.0
30	.50	3.6	3.9	3.5	---	18	11	.46	3.8	.92	1.4	1.9
31	.49	---	3.9	3.3	---	21	---	.47	---	.85	1.5	---
TOTAL	14.92	37.85	124.5	113.6	114.2	388.9	392.0	106.72	59.84	67.28	40.13	44.88
MEAN	.48	1.26	4.02	3.66	4.08	12.5	13.1	3.44	1.99	2.17	1.29	1.50
MAX	1.1	3.8	4.4	4.0	6.4	21	23	9.7	3.8	4.2	2.2	2.5
MIN	.20	.44	3.6	3.3	3.0	6.0	6.7	.46	.45	.80	.52	.54
CFSM	.03	.07	.23	.21	.23	.71	.75	.20	.11	.12	.07	.09
IN.	.03	.08	.26	.24	.24	.83	.83	.23	.13	.14	.09	.10

CAL YR 1976 TOTAL 2835.02 MEAN 7.75 MAX 33 MIN .05 CFSM .44 IN 6.03
WTR YR 1977 TOTAL 1504.82 MEAN 4.12 MAX 23 MIN .20 CFSM .24 IN 3.20

04099000 ST. JOSEPH RIVER AT MOTTVILLE, MI

LOCATION.--Lat 41°48'03", long 85°45'22", in SW¼ sec. 6, T.8 S., R.12 W., Michigan meridian, St. Joseph County, Hydrologic Unit 04050001, on right bank 500 ft (152 m) upstream from bridge on U.S. Highway 12 at Mottville, 0.4 mi (0.6 km) downstream from Michigan Power Co. hydroelectric plant, 4 mi (6 km) upstream from Pigeon River, and at mile 96 (154 km).

DRAINAGE AREA.--1,866 mi² (4,833 km²).

PERIOD OF RECORD.--October 1923 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1930, 1932, 1938, 1940-42, 1945. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 755.3 ft (230.22 m) above mean sea level (Michigan Power Co. bench mark). Prior to Oct. 1, 1951, at site 0.4 mi (0.6 km) upstream at datum 4.2 ft (1.28 m) higher.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by powerplants above station. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--54 years, 1,531 ft³/s (43.36 m³/s), 11.14 in/yr (283 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft³/s (303 m³/s) Apr. 27, 1950, gage height, 6.56 ft (1.999 m), site and datum then in use; minimum daily, 39 ft³/s (1.10 m³/s) Oct. 19, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,580 ft³/s (101 m³/s) Mar. 31, gage height, 5.33 ft (1.625 m); minimum, 152 ft³/s (4.30 m³/s) May 17, gage height, 1.17 ft (0.357 m); minimum daily, 450 ft³/s (12.7 m³/s) Aug. 6.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1350	1440	994	840	700	1910	3220	1950	756	976	474	812
2	677	1250	1310	820	700	1780	3230	2090	796	1170	468	1000
3	632	522	1240	800	700	1780	3230	1710	804	944	462	804
4	892	790	756	800	700	2060	3140	1410	744	949	456	900
5	884	1050	756	740	700	2040	3210	1720	732	900	456	892
6	900	932	1080	780	700	2610	3290	2050	852	924	450	1000
7	932	1100	1070	780	700	2660	3250	1850	748	900	456	852
8	967	1100	1090	770	700	2680	3110	1600	772	724	468	836
9	994	1100	1090	760	700	2590	2960	1830	916	716	522	820
10	1160	1190	1240	750	700	2750	2840	1770	1240	716	602	572
11	724	1010	892	750	700	2810	2930	1640	828	655	662	580
12	1260	852	515	740	700	2650	2550	1620	724	685	876	812
13	1090	625	916	740	700	2410	2410	1620	940	692	860	868
14	985	884	812	740	710	2430	2340	1310	952	647	868	967
15	958	1260	954	740	720	2790	2310	1450	780	640	868	1600
16	662	1010	958	730	720	2600	2030	1690	860	632	617	1770
17	670	958	1010	720	730	2520	1490	1260	1110	647	780	1370
18	1090	898	756	720	730	2540	2050	1060	949	640	796	1230
19	1060	844	828	720	730	2430	1710	1140	662	617	844	1220
20	976	595	1030	720	720	2410	1620	1270	836	617	685	1260
21	940	764	958	720	764	2420	1620	1210	756	557	655	1210
22	1060	949	924	720	748	2500	1800	985	740	550	572	1010
23	625	1150	994	720	876	2450	1760	1240	716	550	610	967
24	788	716	876	720	1510	2460	1910	1120	756	543	670	1140
25	1160	529	820	720	1610	2360	2030	1110	1150	543	700	1130
26	958	1250	836	710	1750	2400	2010	1050	932	536	852	1350
27	860	1020	828	700	2050	2500	2190	1020	617	522	640	1260
28	1000	1060	844	700	2000	2440	2260	876	543	501	580	1460
29	844	1450	884	700	---	2800	2390	1020	700	494	764	1560
30	617	1020	860	700	---	2960	1920	670	662	494	836	1200
31	836	---	850	700	---	3330	---	860	---	480	788	---
TOTAL	28551	29324	28975	23020	25468	78200	73410	43641	24617	21211	20337	32452
MEAN	921	977	935	743	910	2523	2447	1408	821	684	656	1082
MAX	1350	1450	1310	840	2050	3330	3290	2090	1280	1170	876	1770
MIN	617	522	515	700	700	1780	1620	670	543	480	450	572
CFSM	.49	.52	.50	.40	.49	1.35	1.31	.76	.44	.37	.35	.58
IN.	.57	.58	.58	.46	.51	1.56	1.46	.87	.49	.42	.41	.65

CAL YR 1976 TOTAL 699155 MEAN 1910 MAX 7150 MIN 304 CFSM 1.02 IN 13.94
WTR YR 1977 TOTAL 429206 MEAN 1176 MAX 3330 MIN 450 CFSM .63 IN 8.56

04099750 PIGEON RIVER NEAR SCOTT, IN

LOCATION.--Lat 41°44'56", long 85°34'35", in SE¼ NW¼ sec.14, T.38 N., R.8 E., Lagrange County, Hydrologic Unit 04050001, on right bank 20 ft (6 m) downstream from bridge on County Road 750 North, 1,200 ft (366 m) downstream from Page ditch, 0.7 mile (1.1 km) south of Indiana-Michigan state line, and 1.2 miles (1.9 km) northwest of Scott.

DRAINAGE AREA.--361 mi² (935 km²), of which 53.9 mi² (139.6 km²) does not contribute directly to surface runoff.

PERIOD OF RECORD.--June 1968 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 815.00 ft (248.412 m) above mean sea level.

REMARKS.--Records good.

AVERAGE DISCHARGE.--9 years, 333 ft³/s (9.43 m³/s), 12.53 in/yr (318 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,780 ft³/s (50.4 m³/s) Mar. 5, 1976, gage height, 7.07 ft (2.155 m); minimum daily, 42 ft³/s (1.19 m³/s) Oct. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 937 ft³/s (26.5 m³/s) Mar. 30, gage height, 5.22 ft (1.591 m); minimum daily, 102 ft³/s (2.89 m³/s) Aug. 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	155	182	268	205	149	458	803	460	173	240	115	162
2	152	173	273	200	148	451	797	469	144	238	106	212
3	150	166	299	198	145	456	831	520	160	206	102	189
4	146	168	336	196	142	573	851	493	162	197	106	167
5	146	169	331	194	140	777	837	444	166	193	106	153
6	199	169	298	190	140	849	812	497	173	182	105	144
7	253	170	257	190	140	775	754	511	165	147	110	138
8	230	168	233	188	141	750	751	473	159	144	137	135
9	202	170	242	185	143	773	702	438	177	156	170	129
10	188	168	238	182	145	806	666	422	181	147	172	123
11	180	170	190	181	148	819	630	410	174	141	177	117
12	174	167	184	180	150	818	591	397	247	143	169	115
13	172	164	181	178	152	842	560	383	215	154	155	140
14	170	162	175	176	158	835	531	371	178	160	141	179
15	168	160	185	174	155	787	506	357	167	152	134	180
16	163	158	195	172	150	738	484	341	158	171	135	247
17	161	156	205	170	151	688	467	328	158	180	165	212
18	156	155	229	168	152	671	454	329	174	166	161	243
19	158	156	222	168	158	666	437	328	162	169	147	259
20	169	156	227	166	162	671	431	306	146	156	148	244
21	171	155	279	164	174	672	427	288	139	152	165	228
22	165	155	274	162	190	668	435	273	130	158	175	219
23	161	153	247	160	234	659	466	261	123	150	167	211
24	163	150	235	158	332	636	461	251	124	154	176	273
25	170	149	228	156	631	615	444	237	168	162	167	322
26	167	170	220	155	545	597	444	224	190	154	155	335
27	163	232	215	154	482	586	448	212	159	143	151	385
28	159	259	210	152	464	658	455	202	152	137	143	351
29	157	241	210	151	---	822	472	194	163	134	161	316
30	163	299	208	150	---	926	475	186	181	133	186	294
31	179	---	205	150	---	867	---	179	---	126	161	---
TOTAL	5310	5270	7299	5373	6021	21909	17422	10784	4968	5045	4568	6422
MEAN	171	176	235	173	215	707	581	348	166	163	147	214
MAX	253	299	336	205	631	926	851	520	247	240	186	385
MIN	146	149	175	150	140	451	427	179	123	126	102	115
CFSM	.47	.49	.65	.48	.60	1.96	1.61	.96	.46	.45	.41	.59
IN.	.55	.54	.75	.55	.62	2.26	1.80	1.11	.51	.52	.47	.66

CAL YR 1976 TOTAL 136184 MEAN 372 MAX 1650 MIN 118 CFSM 1.03 IN 14.03
WTR YR 1977 TOTAL 100391 MEAN 275 MAX 926 MIN 102 CFSM .76 IN 10.34

04100222 NORTH BRANCH ELKHART RIVER AT COSPERVILLE, IN

LOCATION.--Lat 41°28'54", long 85°28'32", in NE¼ NW¼ sec.22, T.35 N., R.9 E., Noble County, Hydrologic Unit 04050001, on right bank at downstream side of bridge on County Road 900 North, 1,300 ft (396 m) downstream from Boyd ditch, 1.7 miles (2.7 km) upstream from Hustin ditch, and 3.1 miles (5.0 km) downstream from Waldron Lake.

DRAINAGE AREA.--142 mi² (368 km²).

PERIOD OF RECORD.--October 1971 to current year. October 1950 to September 1971 at site 3.1 miles (5.0 km) upstream, published as North Branch Elkhart River near Cosperville. Records may not be equivalent.

GAGE.--Water-stage recorder. Datum of gage is 880.12 ft (268.261 m) above mean sea level (levels by State of Indiana, Department of Natural Resources).

REMARKS.--Records good. Flow regulated at times by dam at Waldron Lake.

AVERAGE DISCHARGE.--6 years, 125 ft³/s (3.540 m³/s), 11.95 in/yr (304 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 587 ft³/s (16.6 m³/s) Mar. 6, 1976, gage height, 7.25 ft (2.210 m); minimum daily, 2.4 ft³/s (0.068 m³/s) Nov. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 371 ft³/s (10.5 m³/s) Mar. 30, gage height, 5.84 ft (1.780 m); minimum daily, 10 ft³/s (0.28 m³/s) June 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34	48	61	45	33	220	357	142	35	144	26	48
2	32	45	58	53	33	209	362	143	36	157	22	53
3	31	43	56	60	32	209	362	145	35	154	20	52
4	30	44	54	67	32	275	344	145	32	144	19	50
5	31	46	53	62	31	334	322	146	34	132	21	47
6	81	45	52	57	31	355	310	165	37	118	33	43
7	99	45	52	53	31	355	295	170	34	101	41	40
8	82	45	52	49	31	351	282	166	32	98	53	36
9	67	44	51	46	32	350	267	162	44	88	66	32
10	58	43	51	43	32	350	253	152	42	77	68	28
11	53	45	51	41	33	348	238	142	43	67	69	25
12	50	42	51	40	34	352	226	127	43	67	65	23
13	46	41	48	39	37	354	211	111	42	66	60	38
14	45	41	48	38	43	353	200	103	41	62	55	51
15	39	40	47	37	49	345	185	97	38	59	49	59
16	38	39	45	36	60	333	171	88	36	62	50	69
17	37	38	44	36	55	326	162	83	38	62	63	72
18	36	37	43	36	50	330	150	87	39	61	61	87
19	37	37	43	36	49	327	136	86	34	62	54	105
20	41	39	43	36	49	334	124	81	24	62	49	102
21	39	39	41	36	51	339	114	76	18	59	46	91
22	38	37	40	36	60	339	119	73	15	56	45	81
23	40	35	40	36	105	333	140	75	12	50	43	73
24	47	37	40	37	209	327	142	69	10	47	41	81
25	48	37	40	37	242	317	138	64	43	47	36	91
26	45	53	39	38	249	306	137	60	58	41	33	101
27	43	89	39	37	242	297	134	55	58	36	30	101
28	39	97	40	36	231	329	139	50	57	32	28	94
29	37	86	40	35	---	360	145	48	64	32	47	89
30	41	74	41	35	---	366	145	45	86	35	51	84
31	48	---	43	34	---	361	---	40	---	31	48	---
TOTAL	1432	1431	1446	1307	2166	10084	6310	3196	1160	2309	1392	1946
MEAN	46.2	47.7	46.6	42.2	77.4	325	210	103	38.7	74.5	44.9	64.9
MAX	99	97	61	67	249	366	362	170	86	157	69	105
MIN	30	35	39	34	31	209	114	40	10	31	19	23
CFSM	.33	.34	.33	.30	.55	2.29	1.48	.73	.27	.53	.32	.46
IN.	.38	.37	.38	.34	.57	2.64	1.65	.84	.30	.60	.36	.51

CAL YR 1976 TOTAL 43300 MEAN 118 MAX 585 MIN 18 CFSM .83 IN 11.34
WTR YR 1977 TOTAL 34179 MEAN 93.6 MAX 366 MIN 10 CFSM .66 IN 8.95

04100500 ELKHART RIVER AT GOSHEN, IN

LOCATION.--Lat 41°35'36", long 85°50'55", in NE¼ NE¼ sec.8, T.36 N., R.6 E., Elkhart County, Hydrologic Unit 04050001, on right bank 20 ft (6 m) downstream from River Avenue bridge at Goshen, 0.4 mile (0.6 km) upstream from Rock Run, and at mile 16.1 (25.9 km).

DRAINAGE AREA.--594 mi² (1,538 km²).

PERIOD OF RECORD.--April 1931 to current year.

REVISED RECORDS.--WSP 1337: 1939(M). WSP 1557: 1954. WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 769.43 ft (234.522 m) above mean sea level. Prior to Nov. 20, 1931, nonrecording gage at same site and datum.

REMARKS.--Records good.

AVERAGE DISCHARGE.--46 years, 501 ft³/s (14.19 m³/s), 11.45 in/yr (291 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,440 ft³/s (154 m³/s) Apr. 4, 1950, gage height, 10.15 ft (3.094 m); maximum gage height, 10.33 ft (3.149 m) July 10, 1951; minimum daily discharge, 7.0 ft³/s (0.20 m³/s) Aug. 11, 1964, result of extreme regulation.

EXTREMES FOR CURRENT YEAR.--Peak discharge above base of 1,800 ft³/s (51.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 5	1700	1,990	56.4	5.74	1.750	Mar. 29	1200	*2,550	72.2	*6.69	2.039

Minimum daily discharge, 140 ft³/s (3.96 m³/s) Feb. 6.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	232	254	253	202	152	793	1380	507	197	1120	178	250
2	220	256	248	212	150	753	1310	500	196	1270	169	281
3	214	250	245	223	148	752	1320	499	190	875	160	265
4	207	251	242	223	144	1160	1280	493	183	613	160	245
5	218	251	240	218	142	1870	1320	491	185	507	157	235
6	299	246	238	215	140	1710	1300	568	190	458	157	225
7	400	243	235	210	142	1340	1220	715	187	442	157	208
8	368	241	232	202	142	1230	1150	605	182	463	178	200
9	337	239	230	198	144	1210	1060	533	191	454	216	193
10	313	240	235	192	146	1190	991	499	197	412	245	182
11	293	227	230	188	148	1140	930	474	202	388	264	171
12	275	237	224	180	150	1100	861	453	212	396	272	167
13	269	234	221	174	156	1140	808	427	203	388	268	212
14	248	230	206	172	158	1150	758	404	194	352	272	266
15	233	227	215	170	166	1080	708	384	182	328	276	307
16	225	223	215	168	178	996	662	376	175	344	304	404
17	217	223	211	166	190	932	629	376	190	352	344	429
18	211	223	205	166	188	952	589	401	215	340	332	450
19	211	223	200	166	184	1040	563	394	206	332	320	544
20	219	220	195	166	182	1230	547	376	185	312	304	541
21	219	219	190	168	188	1360	526	354	167	300	312	476
22	231	216	185	170	205	1350	526	326	160	324	296	445
23	236	209	180	172	500	1210	562	306	152	264	261	433
24	246	204	180	174	1190	1170	569	290	150	245	239	533
25	252	201	180	180	1630	1170	554	278	191	245	221	571
26	252	227	180	182	1280	1160	531	254	255	219	208	589
27	249	286	180	170	994	1130	510	241	219	203	196	540
28	243	353	180	168	853	1730	512	217	209	190	188	509
29	253	337	182	162	---	2490	528	206	313	187	222	474
30	242	245	188	160	---	2110	521	223	439	184	231	456
31	249	---	192	158	---	1670	---	209	---	178	223	---
TOTAL	7881	7235	6537	5675	9990	39318	24725	12379	6117	12685	7330	10801
MEAN	254	241	211	183	357	1268	824	399	204	409	236	360
MAX	400	353	253	223	1630	2490	1380	715	439	1270	344	589
MIN	207	201	180	158	140	752	510	206	150	178	157	167
CFSM	.43	.41	.36	.31	.60	2.14	1.39	.67	.34	.69	.40	.61
IN.	.49	.45	.41	.36	.63	2.46	1.55	.78	.38	.79	.46	.68

CAL YR 1976 TOTAL 194119 MEAN 530 MAX 3040 MIN 180 CFSM .89 IN 12.16
WTR YR 1977 TOTAL 150673 MEAN 413 MAX 2490 MIN 140 CFSM .70 IN 9.44

04101000 ST. JOSEPH RIVER AT ELKHART, IN

LOCATION.--Lat 41°41'30", long 85°58'30", in SW¼ NE¼ sec.5, T.37 N., R.5 E., Elkhart County, Hydrologic Unit 04050001, on left bank 200 ft (61 m) downstream from mouth of Elkhart River, 200 ft (61 m) upstream from Main Street bridge in Elkhart, 2,000 ft (610 m) downstream from Christiana Creek, and 0.5 mile (0.8 km) downstream from Elkhart Hydroelectric Plant.

DRAINAGE AREA.--3,370 mi² (8,728 km²).

PERIOD OF RECORD.--August 1947 to current year. Gage heights at site 0.8 mile (1.3 km) downstream at different datum from September 1924 to March 1926 are available in the district office.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 700.00 ft (213.360 m) above mean sea level.

REMARKS.--Records good. The flow is regulated by Elkhart Hydroelectric Plant.

AVERAGE DISCHARGE.--30 years, 3,061 ft³/s (86.7 m³/s), 12.33 in/yr (313 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 18,400 ft³/s (521 m³/s) Apr. 5, 1950, gage height, 27.82 ft (8.480 m); minimum daily, 336 ft³/s (9.52 m³/s) Aug. 5, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 7,560 ft³/s (214 m³/s) Mar. 29, gage height, 22.54 ft (6.870 m); minimum daily, 927 ft³/s (26.3 m³/s) Aug. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2150	2040	1760	1380	1110	3150	6060	3420	1080	2560	959	1640
2	1530	2170	1700	1450	1110	3120	5860	3720	1550	3210	957	1810
3	1310	1310	1900	1500	1110	3130	5880	3320	1470	2530	931	1570
4	2310	1360	1600	1560	1110	3940	5750	3400	1410	2300	927	1670
5	1990	1910	1570	1640	1120	5130	5960	3310	1480	2100	929	1630
6	2110	1540	1910	1660	1130	5320	5950	3590	1600	1950	991	1720
7	1950	1930	2000	1640	1140	5210	5820	3720	1390	1860	956	1490
8	1570	1840	1780	1590	1150	4980	5530	3400	1530	1760	1140	1440
9	2020	1850	1850	1520	1160	4830	5370	3390	1630	1700	1150	1430
10	1890	1910	1970	1480	1180	4860	5010	3320	1790	1680	1490	1110
11	1690	1770	2090	1420	1200	4910	4950	3100	1830	1560	1390	1120
12	1990	1630	1360	1390	1220	4990	4670	2980	1380	1660	1620	1300
13	1910	1410	1370	1350	1260	5150	4240	2980	1770	1690	1610	1540
14	1940	1390	1310	1310	1280	5110	4200	2580	1790	1530	1600	1610
15	930	2080	1300	1290	1320	4980	3970	2720	1480	1510	1560	2170
16	938	1700	1250	1260	1380	4750	3850	2950	1550	1460	1410	2750
17	1320	1630	1220	1220	1450	4430	3510	2580	1770	1560	1450	2560
18	1680	1590	1280	1200	1590	4490	3590	2150	1840	1500	1520	2420
19	1760	1600	1450	1190	1900	4440	3300	2290	1450	1470	1580	2660
20	1660	1100	1900	1180	1670	4700	2980	2380	1460	1410	1410	2370
21	1640	1590	1770	1170	1280	4790	3040	2120	1350	1320	1390	2390
22	1720	1680	1380	1160	1400	5070	3180	2160	1300	1300	1320	2260
23	1400	1840	1350	1150	1870	4880	3360	2310	1280	1240	1290	1880
24	1450	1420	1310	1140	3400	4650	3460	2090	1130	1220	1320	2600
25	1940	1170	1300	1130	4340	4550	3620	2000	1740	1230	1340	2900
26	1650	1760	1290	1150	4110	4600	3500	1910	1730	1150	1470	3370
27	1620	2000	1290	1150	3730	4830	3630	1840	1320	1100	1300	2810
28	1690	2050	1290	1140	3680	5280	3700	1490	1570	1030	1210	2890
29	1540	2400	1300	1120	---	6930	3830	1950	1140	1020	1470	3020
30	1370	1830	1310	1110	---	6700	3620	1430	1930	1020	1480	2720
31	1510	---	1330	1110	---	6440	---	1950	---	990	1460	---
TOTAL	52178	51500	47490	40760	49400	150340	131390	82550	45740	49620	40630	62850
MEAN	1683	1717	1532	1315	1764	4850	4380	2663	1525	1601	1311	2095
MAX	2310	2400	2090	1660	4340	6930	6060	3720	1930	3210	1620	3370
MIN	930	1100	1220	1110	1110	3120	2980	1430	1080	990	927	1110
CFSM	.50	.51	.46	.39	.52	1.44	1.30	.79	.45	.48	.39	.62
IN.	.58	.57	.52	.45	.55	1.66	1.45	.91	.50	.55	.45	.69

CAL YR 1976 TOTAL 1274118 MEAN 3481 MAX 13300 MIN 930 CFSM 1.03 IN 14.06
WTR YR 1977 TOTAL 804448 MEAN 2204 MAX 6930 MIN 927 CFSM .65 IN 8.88

04101500 ST. JOSEPH RIVER AT NILES, MI

LOCATION.--Lat 41°49'45", long 86°15'35", in SW¼ sec. 26, T.7 S., R.17 W., Berrien County, Hydrologic Unit 04050001, on right bank 100 ft (30 m) upstream from Main Street Bridge at Niles 0.6 mi (1.0 km) downstream from dam at French Paper Co., 1 mi (2 km) upstream from Dowagiac River, at mile 44 (71 km).

DRAINAGE AREA.--3,666 mi² (9,495 km²).

PERIOD OF RECORD.--October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1931, 1933-36, 1940-43, 1945-46(M), 1949(M). WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 633.02 ft (192.944 m) above mean sea level. Prior to Oct. 1, 1968, at datum 2.00 ft (0.610 m) higher. Oct. 1, 1930 to Feb. 11, 1931, nonrecording gage on Main Street Bridge, and Feb. 12 to June 30, 1931, nonrecording gage 50 ft (15 m) upstream from present site (gage heights referred to mean sea level). Since Apr. 13, 1970, auxiliary water-stage recorder at sewage-treatment plant, 1.1 mi (1.8 km) downstream from base gage at same datum. Oct. 1, 1943 to Apr. 12, 1970, auxiliary gage was headwater gage at hydroelectric plant at Buchanan Dam, 8 mi (13 km) downstream from base gage at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by powerplants above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--47 years, 2,650 ft³/s (75.05 m³/s), 11.66 in/yr (296 mm/yr).

EXTREMES FOR PERIOD OR RECORD.--Maximum discharge, 20,200 ft³/s (572 m³/s) Apr. 5, 1950, gage height, 15.10 ft (4.602 m), present datum; minimum daily, 420 ft³/s (11.9 m³/s) Aug. 30, 1931.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 9,640 ft³/s (273 m³/s) Mar. 30, gage height, 9.66 ft (2.944 m); minimum daily, 1,010 ft³/s (28.6 m³/s) Sept. 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2270	2100	1940	1600	1700	4210	7500	3040	2100	3380	1230	2220
2	2000	2370	2120	1500	1500	3970	7000	3590	1700	3420	1160	2410
3	1490	1980	2440	1970	1500	4260	6980	3640	1700	3130	1350	2250
4	2030	1500	2020	1880	1600	4710	6890	2870	1900	2690	1160	1890
5	2430	1740	1900	1950	1610	6850	7100	3380	1800	2500	1180	2100
6	2460	1810	1970	1730	1440	6290	7300	3310	1600	2310	1180	1940
7	1940	2130	2160	1720	1270	5610	6790	3740	2000	2100	1310	1960
8	2280	1770	2300	1750	1530	6180	6720	3420	1600	2220	1610	1890
9	1900	1970	2190	1680	1700	6140	5980	2490	1920	1840	1490	1780
10	2250	2060	2270	1500	1700	6090	6120	3580	2030	1900	1860	2110
11	2210	2070	2430	1490	1300	5920	5520	3500	2750	2060	2070	1540
12	2210	1750	2010	1500	1300	6130	5410	3710	1880	2170	1850	1010
13	2030	1840	1740	1700	1300	6440	4870	2860	2000	2030	1920	2050
14	2440	1330	1910	1700	1600	6460	4750	3400	2040	1900	2100	2370
15	1700	1910	2030	1760	1890	6270	4630	2760	2090	1860	1790	1870
16	1060	1950	2180	1930	1790	5850	4530	3050	1750	2000	2140	3090
17	1550	1770	2100	1300	1770	5640	3410	3380	2020	1890	1630	2990
18	1640	1950	2140	1100	1940	5740	3640	2940	2660	1870	2010	3310
19	1780	1910	2070	2000	1940	5670	3480	1990	2020	1840	1620	2760
20	1970	1760	2180	1910	2040	5780	2690	2140	2010	1790	1910	3030
21	1700	1690	2500	1630	1950	6270	2740	2520	2320	1860	1760	2670
22	1780	1940	1800	1500	1650	6170	2970	2380	1880	1570	1570	3010
23	1920	1960	2170	1670	2110	6420	3680	2000	1610	1780	1700	2210
24	1450	2010	1820	1690	3490	6090	3430	2500	1670	1530	1540	2740
25	1760	1860	1960	1500	6380	5620	3870	2200	2030	1650	1760	3610
26	2140	1770	2160	1820	5370	5710	3510	2100	2020	1580	1770	3760
27	1810	2600	2030	1770	4960	6100	3640	2000	1660	1330	1740	3680
28	1830	2270	2010	1500	4560	6800	3990	2000	1260	1490	1560	2970
29	1870	2400	1860	1500	---	8960	4280	1700	2150	1070	1950	3050
30	1940	2590	1500	1500	---	8860	3980	2100	2280	1310	2020	3210
31	1890	---	1600	1700	---	7850	---	1800	---	1190	1850	---
TOTAL	59730	58810	63510	51360	63440	189960	147400	86090	58500	61260	51790	75480
MEAN	1927	1960	2049	1657	2266	6128	4913	2777	1950	1976	1671	2516
MAX	2460	2600	2500	2000	6380	8960	7500	3740	2750	3420	2140	3760
MIN	1060	1330	1500	1100	1270	3870	2690	1700	1260	1070	1160	1010
CFSM	.53	.54	.56	.45	.62	1.67	1.34	.76	.53	.54	.46	.69
IN.	.61	.60	.64	.52	.64	1.93	1.50	.87	.59	.62	.53	.77

CAL YR 1976 TOTAL 1371480 MEAN 3747 MAX 14400 MIN 1060 CFSM 1.02 IN 13.92
WTR YR 1977 TOTAL 967330 MEAN 2650 MAX 8960 MIN 1010 CFSM .72 IN 9.82

04101800 DOWAGIAC RIVER AT SUMMERVILLE, MI

LOCATION.--Lat 41°54'57", long 86°12'47", in SE¼ sec.30, T.6 S., R.16 W., Cass County, Hydrologic Unit 04050001, on right bank 30 ft (9 m) upstream from bridge on Indian Lake Road, 0.3 mi (0.5 km) west of Summerville.

DRAINAGE AREA.--255 mi² (660 km²).

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Datum of gage is 692.62 ft (211.111 m) above mean sea level.

REMARKS.--Records good. Flow regulated by millpond and lake-level control dam above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--17 years, 272 ft³/s (7.703 m³/s), 14.49 in/yr (368 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,280 ft³/s (36.2 m³/s) June 26, 1968, gage height, 8.78 ft (2.676 m); minimum, 86 ft³/s (2.44 m³/s) Sept. 10, 1964; minimum gage height, 2.57 ft (0.783 m) Aug. 8, 9, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 663 ft³/s (18.8 m³/s) Feb. 25, gage height, 5.94 ft (1.811 m); minimum, 110 ft³/s (3.12 m³/s) Aug. 2, gage height, 2.82 ft (0.860 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	176	220	276	222	174	385	390	285	159	305	115	244
2	172	214	265	223	185	352	407	279	171	244	112	450
3	164	219	236	224	192	340	502	277	170	215	116	373
4	166	233	254	224	195	496	453	289	164	205	117	302
5	163	251	247	217	197	615	482	312	168	195	121	270
6	218	253	245	206	184	529	455	339	130	180	128	248
7	242	253	248	226	195	492	431	320	173	168	135	228
8	224	249	242	205	190	447	402	285	170	162	160	215
9	217	245	234	204	194	497	376	265	185	158	173	205
10	212	244	234	202	200	494	359	255	174	152	203	193
11	205	251	[illegible]	203	213	440	340	247	190	149	211	181
12	200	249	[illegible]	207	230	445	324	240	196	156	213	176
13	195	247	232	206	259	497	314	234	191	153	194	240
14	184	244	224	212	254	490	307	228	185	147	182	289
15	182	243	227	215	251	444	300	222	177	144	170	273
16	181	239	224	187	234	398	292	214	172	140	161	333
17	180	231	222	145	234	370	285	208	168	141	158	307
18	180	241	220	204	236	396	281	208	236	141	150	353
19	182	230	220	204	228	404	275	204	203	137	144	342
20	193	227	295	207	224	402	260	199	190	131	141	297
21	197	225	261	203	214	405	261	191	183	124	144	271
22	198	227	255	203	220	428	334	189	177	128	177	255
23	198	223	254	200	248	440	360	185	171	123	164	242
24	202	221	237	202	244	404	331	182	164	122	159	298
25	200	221	252	207	244	356	321	180	188	129	152	353
26	204	220	244	207	264	365	353	175	176	124	148	467
27	198	351	234	199	482	351	326	171	165	120	176	438
28	195	355	234	171	425	423	322	167	167	118	164	365
29	193	312	214	172	---	573	324	166	173	117	224	328
30	197	270	216	177	---	515	309	164	215	119	225	306
31	231	---	224	140	---	435	---	161	---	117	199	---
TOTAL	6054	7451	7439	6245	7036	13038	10005	7041	5401	4704	5036	8842
MEAN	195	248	240	203	273	440	354	227	180	154	162	295
MAX	242	355	276	224	544	615	502	339	236	305	225	467
MIN	163	214	214	104	174	340	275	161	159	117	112	176
CFSM	.77	.97	.94	.80	1.07	1.73	1.39	.89	.71	.60	.64	1.16
IN.	.88	1.09	1.09	.92	1.11	1.99	1.55	1.03	.79	.69	.73	1.29

CAL YR 1976 TOTAL 109364 MEAN 299 MAX 879 MIN 136 CFSM 1.17 IN 15.51
WTR YR 1977 TOTAL 90192 MEAN 247 MAX 644 MIN 112 CFSM .97 IN 13.16

04102500 PAW PAW RIVER AT RIVERSIDE, MI

LOCATION.--Lat 42°11'10", long 86°22'06", in SW¼ SE¼ sec.23, T.3 S., R.18 W., Berrien County, Hydrologic Unit 04050001, on left bank 40 ft (12 m) upstream from bridge on Coloma Road, 0.8 mi (1.3 km) east of Riverside.

DRAINAGE AREA.--390 mi² (1,010 km²).

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 1337: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 588.80 ft (179.466 m) above mean sea level. May 10, 1966, to July 11, 1967, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Diurnal fluctuation, principally during low flow, caused by paper mill above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--26 years, 427 ft³/s (12.09 m³/s), 14.87 in/yr (378 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,140 ft³/s (60.6 m³/s) Feb. 6, 1968, gage height, 9.32 ft (2.841 m); maximum gage height, 9.49 ft (2.893 m) Apr. 23, 1975; minimum discharge, 99 ft³/s (2.80 m³/s) July 5, 1964, gage height, 2.66 ft (0.811 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,110 ft³/s (31.4 m³/s) Mar. 10, 14, gage height, 8.32 ft (2.536 m); minimum, 206 ft³/s (5.83 m³/s) Aug. 4, 5, gage height, 3.55 ft (1.082 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	290	330	360	350	280	731	774	606	268	302	224	286
2	280	332	350	350	280	748	804	603	274	308	216	344
3	278	339	350	350	290	791	865	592	277	313	212	333
4	276	345	350	340	290	876	901	568	274	308	208	329
5	275	350	350	340	290	1020	830	560	279	285	208	324
6	290	355	350	330	290	990	760	563	283	267	215	319
7	306	353	350	330	290	930	841	539	291	258	223	304
8	312	353	350	330	300	935	824	504	294	252	244	295
9	319	349	350	320	300	1000	810	472	297	247	249	283
10	323	348	350	320	320	1040	786	440	296	241	253	276
11	321	352	350	320	340	1040	753	414	302	235	259	268
12	317	355	350	320	350	1060	714	392	309	234	269	262
13	311	356	350	320	370	1060	668	370	305	236	268	275
14	302	355	350	320	370	1110	616	360	301	234	262	296
15	294	357	350	320	370	1080	579	350	295	232	252	310
16	299	354	340	320	380	1050	545	340	286	229	242	343
17	298	350	340	320	390	1020	516	331	282	237	237	352
18	296	346	340	320	350	990	490	324	311	236	228	355
19	296	345	340	310	340	970	469	320	297	229	226	358
20	296	342	340	310	340	955	454	315	284	230	224	357
21	301	340	340	310	340	925	474	310	273	230	227	354
22	307	338	340	310	350	892	492	306	266	222	229	352
23	309	335	340	310	400	868	513	301	259	217	228	343
24	311	331	340	310	500	842	533	293	257	215	229	383
25	313	329	340	300	674	814	541	284	257	221	231	411
26	313	331	340	300	742	790	555	281	254	222	233	407
27	312	364	340	290	735	768	571	278	253	223	238	423
28	311	397	340	280	716	754	586	273	250	220	234	409
29	309	398	340	280	---	805	599	267	254	217	250	402
30	310	380	340	280	---	845	607	269	270	222	248	399
31	325	---	340	280	---	806	---	267	---	223	263	---
TOTAL	9405	10517	10700	9790	10457	28637	19630	12092	8403	7545	7329	10152
MEAN	303	351	345	316	391	924	654	390	280	243	236	338
MAX	325	398	360	350	742	1110	901	606	311	313	269	423
MIN	275	329	340	280	280	731	454	267	250	215	208	262
CFSM	.78	.90	.89	.81	1.00	2.37	1.68	1.00	.72	.62	.61	.87
IN.	.90	1.00	1.02	.93	1.05	2.73	1.87	1.15	.80	.72	.70	.97

CAL YR 1976 TOTAL 184079 MEAN 503 MAX 1440 MIN 251 CFSM 1.29 IN 17.56
WTR YR 1977 TOTAL 145157 MEAN 398 MAX 1110 MIN 208 CFSM 1.02 IN 13.85

04102700 BLACK RIVER NEAR BANGOR, MI

LOCATION.--Lat 42°21'15", long 86°11'15", in NW¼ sec.28, T.1 S., R.16 W., Van Buren County, Hydrologic Unit 04050002, on left bank 50 ft (15 m) upstream from bridge on 66th Street, 4.9 mi (7.9 km) northwest of Bangor.

DRAINAGE AREA.--83.6 mi² (216.5 km²).

PERIOD OF RECORD.--June 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 610 ft (186 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation caused by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--11 years, 101 ft³/s (2.860 m³/s), 16.41 in/yr (417 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,320 ft³/s (37.4 m³/s) Apr. 19, 1975, gage height, 13.16 ft (4.011 m); minimum, 20 ft³/s (0.57 m³/s) Sept. 28, 1966, gage height, 1.83 ft (0.558 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 400 ft³/s (11.3 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 5	1800	468	13.3	7.95	2.423	Mar. 10	1000	*488	13.8	*8.12	2.475

Minimum discharge, 25 ft³/s (0.71 m³/s) Aug. 23, 25; minimum gage height, 1.87 ft (0.570 m) Aug. 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	35	45	57	40	47	174	180	103	39	53	27	40
2	34	43	52	40	46	151	216	91	39	42	26	50
3	34	41	48	40	45	135	318	81	38	36	26	55
4	34	43	47	40	46	242	232	75	36	35	26	46
5	34	45	45	40	46	439	213	88	42	34	29	41
6	44	45	45	40	46	411	196	96	45	32	38	38
7	46	47	45	40	46	334	171	86	41	31	34	36
8	43	46	45	40	46	337	151	73	38	30	38	34
9	41	45	44	40	46	417	130	65	40	30	39	33
10	39	47	44	40	47	483	116	61	38	29	38	32
11	37	50	44	40	49	433	106	58	39	28	38	31
12	37	49	43	40	52	381	98	55	41	30	39	30
13	37	48	43	40	55	403	90	52	40	32	36	46
14	36	47	42	40	55	397	87	50	37	29	34	64
15	36	46	42	40	54	328	82	48	36	28	32	58
16	36	44	42	41	52	272	78	46	34	28	31	73
17	36	43	42	42	49	222	74	44	34	31	30	66
18	36	43	42	42	47	214	73	43	61	32	29	68
19	36	44	42	43	46	234	69	42	52	30	28	69
20	37	43	45	44	45	245	69	40	41	28	28	61
21	37	43	47	44	45	251	94	39	37	28	26	54
22	40	43	47	45	47	237	107	43	35	27	26	49
23	40	42	47	46	70	213	118	43	33	26	26	46
24	40	41	46	47	150	183	123	39	32	27	26	109
25	40	41	45	48	283	157	117	37	33	31	25	140
26	39	44	43	48	285	141	132	36	32	28	26	106
27	38	65	42	48	249	126	127	35	30	27	29	91
28	37	76	41	47	204	136	123	34	30	26	29	75
29	37	70	40	47	---	248	137	34	31	29	50	64
30	38	62	40	47	---	263	123	34	37	32	43	57
31	46	---	40	47	---	219	---	37	---	29	38	---
TOTAL	1182	1434	1378	1326	2299	8426	3950	1708	1141	958	990	1762
MEAN	38.1	47.8	44.5	42.8	82.1	272	132	55.1	38.0	30.9	31.9	58.7
MAX	46	76	57	48	285	483	318	103	61	53	50	140
MIN	34	41	40	40	45	126	69	34	30	26	25	30
CFSM	.46	.57	.53	.51	.98	3.25	1.58	.66	.46	.37	.38	.70
IN.	.53	.64	.61	.59	1.02	3.75	1.76	.76	.51	.43	.44	.78

CAL YR 1976 TOTAL 37406 MEAN 102 MAX 667 MIN 28 CFSM 1.22 IN 16.64
WTR YR 1977 TOTAL 26554 MEAN 72.8 MAX 483 MIN 25 CFSM .87 IN 11.82

04103500 KALAMAZOO RIVER AT MARSHALL, MI

LOCATION.--Lat 42°15'55", long 84°57'55", on line between sec.25 and 26, T.2 S., R.6 W., Calhoun County, Hydrologic Unit 04050003, on left bank at upstream side of bridge on U.S. Highway 27 at Marshall.

DRAINAGE AREA.--449 mi² (1,163 km²).

PERIOD OF RECORD.--October 1948 to current year. Monthly discharge only for October 1948, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 877.09 ft (267.337 m) above mean sea level (levels by Michigan Department of Natural Resources). Prior to Nov. 11, 1948, nonrecording gage at same site and datum.

REMARKS.--Records good. Diurnal fluctuation caused by powerplant above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 313 ft³/s (8.864 m³/s), 9.47 in/yr (241 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,130 ft³/s (60.3 m³/s) Mar. 29, 1950, gage height, 8.20 ft (2.499 m); minimum, 12 ft³/s (0.34 m³/s) Aug. 2, 1967; minimum gage height, 3.00 ft (0.914 m) May 16, 1963; minimum daily discharge, 31 ft³/s (0.88 m³/s) Aug. 16, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 883 ft³/s (25.0 m³/s) Mar. 29, gage height, 5.73 ft (1.747 m); minimum not determined; minimum daily, 57 ft³/s (1.61 m³/s) Aug. 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	267	309	204	243	190	430	770	406	217	195	241	290
2	306	212	297	267	190	430	740	420	233	170	170	194
3	205	294	226	291	196	540	720	354	192	369	57	76
4	199	309	220	228	209	600	710	420	233	229	150	271
5	295	237	237	190	215	670	700	347	270	241	198	80
6	293	207	288	252	218	730	680	341	299	202	58	266
7	340	273	138	164	198	730	670	337	220	222	131	196
8	334	294	258	190	309	720	650	331	267	200	236	66
9	299	154	264	204	237	710	600	304	312	126	71	218
10	368	267	240	220	207	700	530	313	213	226	300	72
11	227	297	273	190	218	680	490	255	254	253	81	132
12	355	201	237	198	246	660	460	325	276	201	258	197
13	233	249	217	240	246	640	430	323	308	235	168	298
14	242	226	215	152	240	580	410	319	211	174	144	79
15	259	291	246	188	226	530	390	259	274	201	285	277
16	213	185	246	177	234	476	380	225	253	71	209	141
17	285	201	270	226	226	364	380	200	238	85	134	220
18	180	264	207	201	237	486	380	271	107	254	72	378
19	231	249	306	243	207	500	390	295	359	249	136	193
20	285	226	264	212	207	389	410	288	220	231	233	189
21	193	180	185	232	204	439	341	224	90	171	165	182
22	267	306	282	175	255	435	398	237	297	68	89	239
23	291	196	252	180	273	383	427	254	173	171	171	201
24	264	215	300	261	400	424	593	220	229	166	248	208
25	249	159	228	159	500	442	548	253	93	136	114	280
26	212	351	300	226	520	379	557	209	209	195	298	215
27	291	321	267	196	520	463	473	212	270	174	69	180
28	217	336	267	209	470	583	524	273	224	147	207	315
29	243	405	201	212	---	789	408	160	217	241	259	277
30	267	252	303	223	---	829	480	136	263	129	190	257
31	297	---	215	201	---	810	---	257	---	107	74	---
TOTAL	8207	7666	7653	6550	7598	17541	15639	8768	7021	5839	5216	6187
MEAN	265	256	247	211	271	566	521	283	234	188	168	206
MAX	368	405	306	291	520	829	770	420	359	369	300	378
MIN	180	154	138	152	190	364	341	136	90	68	57	66
CFSM	.59	.57	.55	.47	.60	1.26	1.16	.63	.52	.42	.37	.46
IN.	.68	.64	.63	.54	.63	1.45	1.30	.73	.58	.48	.43	.51

CAL YR 1976 TOTAL 150354 MEAN 411 MAX 1440 MIN 61 CFSM .92 IN 12.46
WTR YR 1977 TOTAL 103885 MEAN 285 MAX 829 MIN 57 CFSM .64 IN 8.61

04105000 BATTLE CREEK AT BATTLE CREEK, MI

LOCATION.--Lat 42°19'55", long 85°09'15", in NW¼ sec.5, T.2 S., R.7 W., Calhoun County, Hydrologic Unit 04050003, on right bank 350 ft (107 m) upstream from Emmett Street Bridge at Battle Creek, and 3.0 mi (4.8 km) upstream from mouth.

DRAINAGE AREA.--241 mi² (624 km²).

PERIOD OF RECORD.--October 1930 to September 1931, October 1932 to July 1933, January 1934 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1931, 1944. WSP 1507: 1956.

GAGE.--Water-stage recorder. Datum of gage is 823.24 ft (250.924 m) above mean sea level (levels by Michigan Department of Natural Resources). Prior to May 14, 1951, nonrecording gage, at same site datum.

REMARKS.--Records good except those for periods of no gage-height record, Jan. 29 to July 7, which are fair. Occasional slight regulation prior to November 1943. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--44 years (water years 1931, 1935-77), 197 ft³/s (5.579 m³/s), 11.10 in/yr (282 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,640 ft³/s (103 m³/s) Apr. 7, 1947, gage height, 4.48 ft (1.366 m), from floodmark; minimum, 22 ft³/s (0.62 m³/s) Aug. 14, 1934; minimum gage height, about -0.5 ft (-.152 m) in July 1936 and on Aug. 31, 1939, due to opening of gates at dam forming control.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 576 ft³/s (16.3 m³/s) Apr. 1, gage height, 1.62 ft (0.494 m), from graph based on gage readings; minimum, 45 ft³/s (1.27 m³/s) Aug. 28, gage height, 0.54 ft (.165 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	123	98	126	81	84	273	568	294	75	98	55	57
2	119	98	115	78	81	268	552	263	78	80	52	63
3	115	98	101	78	81	289	504	235	78	70	52	66
4	78	91	94	81	81	252	460	218	75	100	52	63
5	81	88	91	81	78	274	454	213	75	84	55	63
6	130	88	91	81	78	327	460	213	115	84	57	60
7	180	84	91	81	78	434	454	194	118	75	60	57
8	170	84	91	81	78	520	445	176	115	72	60	57
9	150	81	91	78	78	520	428	158	115	66	63	57
10	130	81	91	78	80	504	410	150	122	60	75	57
11	115	81	91	75	82	467	376	142	115	57	84	57
12	105	81	91	78	86	441	354	134	108	57	81	57
13	95	78	88	84	94	434	316	130	118	57	75	75
14	87	78	84	84	98	434	278	126	118	55	66	91
15	82	78	84	84	98	467	278	126	91	55	60	101
16	77	78	84	84	101	410	237	108	84	57	60	115
17	74	75	84	98	104	382	218	108	78	63	60	123
18	71	78	88	91	98	366	198	104	78	63	57	138
19	72	81	91	84	94	327	185	111	78	60	52	150
20	75	81	98	81	94	316	185	104	81	60	52	150
21	78	81	94	81	94	289	180	101	75	57	52	138
22	84	81	98	81	91	284	180	94	60	55	55	130
23	84	81	94	81	91	278	208	84	50	52	55	126
24	88	81	94	81	138	278	232	84	47	55	60	134
25	84	81	94	81	198	278	252	87	50	57	57	150
26	84	94	94	81	208	278	289	84	48	55	57	155
27	81	130	91	81	257	278	316	81	47	52	52	155
28	78	150	91	94	300	294	330	81	72	47	47	146
29	78	142	88	91	---	338	338	78	66	52	60	94
30	81	123	91	81	---	398	327	78	72	57	60	88
31	91	---	108	91	---	540	---	75	---	57	57	---
TOTAL	3040	2724	2902	2565	3123	11238	10012	4234	2502	1969	1840	2973
MEAN	98.1	90.8	93.6	82.7	112	363	334	137	83.4	63.5	59.4	99.1
MAX	180	150	126	98	300	540	568	294	122	100	84	155
MIN	71	75	84	75	78	252	180	75	47	47	47	57
CFSM	.41	.38	.39	.34	.47	1.51	1.39	.57	.35	.26	.25	.41
IN.	.47	.42	.45	.40	.48	1.73	1.55	.65	.39	.30	.28	.46

CAL YR 1976 TOTAL 88034 MEAN 241 MAX 1540 MIN 54 CFSM 1.00 IN 13.59
WTR YR 1977 TOTAL 49122 MEAN 135 MAX 568 MIN 47 CFSM .56 IN 7.58

04105500 KALAMAZOO RIVER NEAR BATTLE CREEK, MI

LOCATION.--Lat 42°19'26", long 85°11'51", in SW¼ sec.1, T.2 S., R.8 W., Calhoun County, Hydrologic Unit 04050003, on left bank 20 ft (6 m) upstream from bridge on Kendall Street in Battle Creek.

DRAINAGE AREA.--824 mi² (2,134 km²).

PERIOD OF RECORD.--July 1937 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 924: 1938-39. WSP 1387: 1938, 1945-46, 1948.

GAGE.--Water-stage recorder. Altitude of gage is 815 ft (248 m) from topographic map (nearest 5 ft). Prior to Oct. 1, 1957, water-stage recorder at site 4.7 mi (7.6 km) downstream at different datum. Oct. 1, 1957, to June 15, 1959, nonrecording gage at bridge 1,800 ft (549 m) upstream at different datum. June 16, 1959, to Oct. 13, 1960, nonrecording gage at present site and datum.

REMARKS.--Records good. Diurnal fluctuation, below 1,500 ft³/s (42.5 m³/s), caused by powerplants above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 650 ft³/s (18.41 m³/s), 10.71 in/yr (272 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,290 ft³/s (206 m³/s) Apr. 7, 1947, gage height, 9.13 ft (2.783 m), site and datum then in use; minimum, 50 ft³/s (1.42 m³/s) Sept. 22, 1939, site then in use; minimum daily, 86 ft³/s (2.44 m³/s) Aug. 5, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,620 ft³/s (45.9 m³/s) Mar. 31, gage height, 4.63 ft (1.411 m); minimum, 161 ft³/s (4.56 m³) July 23, Aug. 4, gage height, 2.86 ft (0.872 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	470	539	477	450	332	962	1610	899	319	389	224	280
2	464	464	444	438	310	863	1570	908	313	311	327	419
3	457	490	470	407	310	881	1510	791	304	283	275	332
4	401	560	431	407	326	1080	1450	766	275	439	179	233
5	451	457	470	359	337	1260	1450	791	451	327	246	326
6	715	431	451	343	332	1350	1450	707	391	313	310	219
7	567	483	483	395	310	1480	1420	667	428	296	199	337
8	597	464	383	280	321	1500	1390	620	397	300	290	295
9	651	425	457	321	477	1480	1330	567	449	269	343	203
10	582	395	464	326	377	1470	1210	532	415	203	310	290
11	511	464	483	343	371	1420	1050	560	373	293	407	191
12	546	457	483	343	419	1440	989	438	406	319	275	224
13	539	438	377	337	431	1440	953	575	405	278	354	431
14	470	401	419	365	438	1430	944	525	401	297	295	444
15	457	438	401	354	407	1350	691	497	350	268	280	359
16	438	497	419	360	360	1270	783	365	347	285	389	457
17	470	395	425	360	383	1100	791	431	356	181	326	395
18	400	413	431	354	401	1080	774	425	329	184	233	490
19	360	464	401	321	425	1130	740	444	258	341	187	546
20	490	451	457	332	401	1110	783	451	388	363	215	383
21	483	401	457	332	420	935	783	383	299	313	310	413
22	383	425	383	332	425	1030	791	395	218	265	280	359
23	532	490	444	315	539	1010	917	326	322	167	233	413
24	511	377	425	326	800	917	1020	407	258	268	295	477
25	483	371	444	348	1020	1050	1090	343	312	280	315	444
26	407	504	438	343	1020	935	1140	348	211	236	275	525
27	444	675	425	377	1040	980	1060	308	277	272	337	438
28	464	740	419	360	1070	1240	1170	291	318	268	224	444
29	401	667	419	360	---	1440	1030	385	332	283	371	518
30	525	511	438	350	---	1570	1020	206	375	342	365	477
31	518	---	450	340	---	1600	---	265	---	246	315	---
TOTAL	15187	14287	13568	10978	13802	37803	32909	15616	10277	8879	8984	11362
MEAN	490	476	438	354	493	1219	1097	504	343	286	290	379
MAX	715	740	483	450	1070	1600	1610	908	451	439	407	546
MIN	360	371	377	280	310	863	691	206	211	167	179	191
CFSM	.60	.58	.53	.43	.60	1.48	1.33	.61	.42	.35	.35	.46
IN.	.69	.64	.61	.50	.62	1.71	1.49	.70	.46	.40	.41	.51

CAL YR 1976 TOTAL 314911 MEAN 860 MAX 3440 MIN 236 CFSM 1.04 IN 14.22
WTR YR 1977 TOTAL 193652 MEAN 531 MAX 1610 MIN 167 CFSM .64 IN 8.74

04105700 AUGUSTA CREEK NEAR AUGUSTA, MI

LOCATION.--Lat 42°21'12", long 85°21'14", in SW¼ sec.27, T.1 S., R.9 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 15 ft (5 m) downstream from bridge on EF Road, and 1.3 mi (2.1 km) north of Augusta.

DRAINAGE AREA.--38.9 mi² (100.8 km²).

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 815 ft (248 m) from topographic map. Prior to June 15, 1965, nonrecording gage at same site and datum.

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--13 years, 42.2 ft³/s (1.195 m³/s), 14.73 in/yr (374 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 308 ft³/s (8.72 m³/s) Apr. 19, 1975, gage height, 3.06 ft (0.933 m); minimum, 9.5 ft³/s (0.27 m³/s) Dec. 30, 1970, result of freezeup; minimum gage height, 0.65 ft (0.198 m) Jan. 19, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 95 ft³/s (2.69 m³/s) Mar. 4, gage height, 1.90 ft (0.579 m); minimum, 14 ft³/s (0.40 m³/s) July 27, gage height, 0.74 ft (0.226 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	33	42	42	34	32	50	56	40	26	39	19	42
2	33	40	39	34	32	46	65	39	26	32	18	47
3	33	39	41	33	31	48	88	37	25	29	18	44
4	31	38	39	33	30	79	82	39	24	28	19	38
5	32	38	37	31	30	92	74	42	32	28	21	35
6	50	37	37	35	30	79	68	40	36	25	25	32
7	53	36	37	34	30	64	62	38	33	25	26	30
8	47	35	35	33	30	60	57	37	31	20	27	29
9	42	35	36	34	30	67	53	35	38	18	28	28
10	39	36	36	34	29	74	50	34	35	17	37	26
11	37	36	35	34	30	75	47	33	34	17	38	25
12	36	36	36	35	31	76	45	32	35	22	35	24
13	34	35	34	35	36	77	44	31	33	21	31	39
14	35	35	33	35	38	75	43	29	32	20	29	46
15	34	34	34	35	36	68	42	31	30	19	27	45
16	33	34	34	34	33	58	41	30	28	21	27	47
17	33	34	34	37	32	49	41	30	26	24	27	44
18	32	34	33	37	31	53	41	32	28	23	24	43
19	33	35	34	36	29	55	41	31	27	24	23	42
20	35	34	37	36	30	57	42	30	24	22	22	38
21	37	34	34	35	29	56	47	28	23	20	22	36
22	40	34	35	34	31	57	49	27	22	19	24	33
23	39	34	35	34	33	57	59	28	21	17	23	32
24	38	34	34	33	72	54	58	27	21	19	28	48
25	39	34	35	32	85	51	58	26	24	22	26	56
26	37	43	34	32	73	49	62	25	23	17	24	53
27	36	57	33	31	61	48	56	23	21	15	23	47
28	35	56	35	32	55	59	52	22	20	16	24	41
29	35	48	33	33	---	73	48	22	25	21	59	37
30	36	44	37	33	---	71	44	22	32	23	61	35
31	43	---	36	33	---	63	---	24	---	21	49	---
TOTAL	1150	1141	1104	1051	1069	1940	1615	964	835	684	884	1162
MEAN	37.1	38.0	35.6	33.9	38.2	62.6	53.8	31.1	27.8	22.1	28.5	38.7
MAX	53	57	42	37	85	92	88	42	38	39	61	56
MIN	31	34	33	31	29	46	41	22	20	15	18	24
CFSM	.95	.98	.92	.87	.98	1.61	1.38	.80	.72	.57	.73	1.00
IN.	1.10	1.09	1.06	1.01	1.02	1.86	1.54	.92	.80	.65	.85	1.11

CAL YR 1976 TOTAL 16431 MEAN 44.9 MAX 116 MIN 23 CFSM 1.15 IN 15.71
WTR YR 1977 TOTAL 13599 MEAN 37.3 MAX 92 MIN 15 CFSM .96 IN 13.00

04106000 KALAMAZOO RIVER AT COMSTOCK, MI

LOCATION.--Lat 42°17'05", long 85°30'50", in NE¼ sec.19, T.2 S., R.10 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank at downstream side of bridge on River Street in Comstock, 0.2 mi (0.3 km) downstream from Comstock Creek.

DRAINAGE AREA.--1,010 mi² (2,620 km²), approximately.

PERIOD OF RECORD.--April to August 1931, October 1932 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 824: 1933-36. WSP 1387: 1933, 1934(M), 1935, 1936(M), 1938(M), 1940(M), 1941.

GAGE.--Water-stage recorder. Datum of gage is 759.12 ft (231.380 m) above mean sea level. Prior to November 1945, nonrecording gage at same site and datum.

REMARKS.--Records good. Flow regulated by powerplants above station. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--45 years, (water years 1933-77), 844 ft³/s (23.90 m³/s), 11.35 in/yr (288 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,910 ft³/s (196 m³/s) Apr. 8, 1947, gage height, 7.94 ft (2.420 m); minimum, 119 ft³/s (3.37 m³/s) May 29, 1958, gage height, 0.09 ft (0.027 m); minimum daily, 185 ft³/s (5.24 m³/s) Aug. 7, 1934.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,850 ft³/s (52.4 m³/s) Apr. 1, gage height, 2.73 ft (0.832 m); minimum, 290 ft³/s (8.21 m³/s) July 14, gage height, 0.81 ft (0.247 m); minimum daily, 305 ft³/s (8.64 m³/s) Aug. 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	580	698	714	538	531	1240	1770	1180	377	636	371	571
2	622	690	754	531	545	1130	1780	1110	440	690	353	580
3	580	658	667	580	545	1070	1790	1080	454	552	413	562
4	545	658	622	608	552	1180	1760	954	440	496	425	571
5	552	690	667	629	559	1390	1650	986	454	461	378	520
6	698	608	746	601	538	1480	1660	946	566	440	359	543
7	874	615	754	587	524	1560	1620	810	601	447	399	354
8	778	643	722	559	524	1620	1570	810	675	426	417	486
9	738	629	667	552	531	1680	1480	818	636	384	390	422
10	754	615	698	545	615	1680	1410	682	615	384	515	351
11	762	580	698	538	629	1640	1340	629	667	352	538	373
12	666	615	690	545	659	1620	1150	698	608	419	572	355
13	629	622	682	538	698	1610	1000	706	587	419	507	406
14	636	608	622	545	706	1620	1030	682	587	389	503	548
15	573	587	644	573	675	1560	1040	682	573	398	468	737
16	587	601	644	552	601	1520	930	675	510	346	523	742
17	545	643	636	524	580	1480	874	573	517	391	439	677
18	573	594	651	524	644	1350	914	566	426	426	403	651
19	426	580	636	538	636	1260	882	580	447	391	373	661
20	454	601	651	552	622	1330	898	608	419	433	305	684
21	629	622	636	566	580	1310	890	608	468	429	314	591
22	658	594	559	566	594	1220	994	545	433	385	358	604
23	643	608	601	545	615	1240	1010	503	364	346	366	502
24	658	650	573	538	978	1220	1060	517	352	318	366	577
25	674	622	594	559	1130	1110	1290	545	419	340	456	778
26	629	636	651	587	1230	1160	1330	496	398	359	418	782
27	587	818	601	503	1280	1120	1310	524	391	352	430	661
28	587	1010	615	510	1290	1230	1290	426	398	352	471	595
29	587	986	601	503	---	1440	1300	447	426	366	501	602
30	559	818	524	496	---	1620	1220	475	531	446	588	625
31	650	---	489	517	---	1720	---	433	---	394	611	---
TOTAL	19433	19899	20009	17049	19611	43410	38242	21294	14779	12967	13530	17111
MEAN	627	663	645	550	700	1400	1275	687	493	418	436	570
MAX	874	1010	754	629	1290	1720	1790	1180	675	690	611	782
MIN	426	580	489	496	524	1070	874	426	352	318	305	351
CFSM	.62	.66	.64	.55	.69	1.39	1.26	.68	.49	.41	.43	.56
IN.	.72	.73	.74	.63	.72	1.60	1.41	.78	.54	.48	.50	.63

CAL YR 1976 TOTAL 401150 MEAN 1096 MAX 3890 MIN 382 CFSM 1.09 IN 14.78
WTR YR 1977 TOTAL 257334 MEAN 705 MAX 1790 MIN 305 CFSM .70 IN 9.48

04106300 PORTAGE CREEK NEAR KALAMAZOO, MI

LOCATION.--Lat 42°14'46", long 85°34'33", in SE¼ sec.34, T.2 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 25 ft (8 m) upstream from bridge on Lovers Lane, and 3.0 mi (4.8 km) south of Kalamazoo.

DRAINAGE AREA.--22.4 mi² (58.0 km²).

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 814.88 ft (248.375 m) above mean sea level.

REMARKS.--Records good. Flow includes water which is pumped from ground-water sources by industry and discharged into stream two miles above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--13 years, 40.2 ft³/s (1.138 m³/s), 24.37 in/yr (619 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 206 ft³/s (5.83 m³/s) Apr. 18, 1975, gage height, 3.81 ft (1.161 m); minimum, 8.0 ft³/s (0.23 m³/s) Jan. 19, 1965, gage height, 0.88 ft (0.268 m), result of bridge construction upstream.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 85 ft³/s (2.41 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 24	0800	*109	3.09	*2.89	0.881	Mar. 28	1800	89	2.52	2.66	0.811
Mar. 4	1700	102	2.89	2.81	0.856	June 30	1800	89	2.52	2.68	0.817

Minimum discharge, 20 ft³/s (0.57 m³/s) July 23, 24, gage height, 1.40 ft (0.427 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	31	29	29	27	37	40	34	34	30	32	24	39
2	30	29	29	27	37	39	47	36	30	28	23	47
3	28	28	28	29	38	44	41	34	29	27	24	30
4	30	28	27	31	38	79	40	34	29	26	27	27
5	33	30	27	29	36	58	42	34	39	29	31	27
6	51	32	29	29	34	45	37	34	33	29	28	28
7	34	32	29	30	36	45	34	33	31	28	25	27
8	33	33	28	28	36	50	33	32	33	28	28	28
9	30	31	28	28	37	54	32	32	33	27	27	28
10	30	28	29	29	38	54	33	31	31	25	39	28
11	32	28	27	28	41	53	35	31	34	27	31	27
12	32	28	26	29	41	57	34	31	30	28	29	28
13	32	27	27	30	38	53	34	32	31	27	27	43
14	31	25	27	31	37	48	34	30	31	32	25	33
15	31	27	27	31	37	42	34	29	31	29	26	38
16	29	27	27	29	37	38	31	31	31	28	26	34
17	28	27	27	30	36	37	31	34	31	27	25	31
18	29	27	25	32	36	43	32	33	30	27	24	33
19	30	27	25	31	35	40	32	30	28	26	24	32
20	31	26	28	31	33	43	33	30	29	26	23	31
21	32	26	26	31	34	39	32	28	30	24	24	30
22	31	26	26	30	37	40	37	28	30	23	25	30
23	29	26	26	29	45	38	37	28	29	21	25	29
24	29	26	26	30	83	36	32	28	29	21	26	47
25	30	26	26	32	57	36	38	28	28	24	24	33
26	29	35	26	32	46	34	35	27	26	22	25	35
27	29	43	27	31	42	34	35	28	27	23	24	33
28	28	32	26	33	43	55	43	25	28	23	25	31
29	29	31	26	33	---	51	39	25	32	25	44	30
30	29	30	27	34	---	41	35	25	47	24	28	31
31	30	---	30	36	---	37	---	28	---	24	26	---
TOTAL	960	870	841	940	1125	1403	1066	943	930	810	832	968
MEAN	31.0	29.0	27.1	30.3	40.2	45.3	35.5	30.4	31.0	26.1	26.8	32.3
MAX	51	43	30	36	83	79	47	36	47	32	44	47
MIN	28	25	25	27	33	34	31	25	26	21	23	27

CAL YR 1976 TOTAL 14382 MEAN 39.3 MAX 124 MIN 25
WTR YR 1977 TOTAL 11688 MEAN 32.0 MAX 83 MIN 21

04106320 WEST FORK PORTAGE CREEK NEAR OSHTEMO, MI

LOCATION.--Lat 42°14'07", long 85°38'54", in SE¼ sec.1, T.3 S., R.12 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank at upstream side of bridge on 12th Street, 2.1 mi (3.4 km) southeast of Oshtemo.

DRAINAGE AREA.--13.0 mi² (33.7 km²).

PERIOD OF RECORD.--May 1972 to current year.

GAGE.--Water-stage recorder. Datum of gage is 868.86 ft (264.829 m) above mean sea level (Kalamazoo County Road Commission bench mark).

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--5 years, 8.76 ft³/s (0.248 m³/s), 9.15 in/yr (232 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 26 ft³/s (0.74 m³/s) Aug. 31, 1975, gage height, 2.15 ft (0.655 m); minimum, 2.0 ft³/s (0.057 m³/s) Aug. 2, 3, 4, 1977; minimum gage height, 1.08 ft (0.329 m) July 23, 24, 27, 28, 29, Aug. 2, 3, 4, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 12 ft³/s (0.34 m³/s) Feb. 24, 25; maximum gage height, 1.69 ft (0.515 m) Feb. 24; minimum discharge, 2.0 ft³/s (0.057 m³/s) Aug. 2, 3, 4; minimum gage height, 1.08 ft (0.329 m) July 23, 24, 27, 28, 29, Aug. 2, 3, 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.6	8.1	8.1	7.1	7.2	7.6	8.0	7.8	4.5	6.4	2.4	6.7
2	6.9	8.0	8.1	7.1	7.1	7.1	8.5	7.8	4.7	6.0	2.3	7.2
3	6.9	7.6	7.6	7.1	7.1	7.2	9.3	7.6	4.5	5.7	2.1	6.7
4	6.7	7.6	7.4	7.1	7.1	9.8	9.3	7.2	4.5	5.2	2.1	5.7
5	6.7	7.6	7.5	7.1	7.1	11	9.3	7.2	5.0	4.8	2.4	5.2
6	8.1	7.6	7.6	7.1	7.1	9.8	8.9	6.9	5.5	4.5	2.6	4.7
7	9.0	7.6	7.7	6.9	7.1	8.9	8.5	6.4	5.3	4.0	2.8	4.4
8	8.4	7.6	7.6	6.9	7.1	8.3	8.0	5.9	5.2	3.4	2.9	4.4
9	8.2	7.6	7.6	6.9	7.3	8.7	7.6	5.5	5.3	3.1	3.1	4.4
10	8.0	7.8	7.7	6.9	8.0	9.3	7.4	5.7	5.3	2.8	3.9	4.0
11	7.9	7.8	7.6	6.9	9.0	8.9	6.9	5.7	5.5	2.8	4.2	3.9
12	7.7	7.8	7.4	6.9	9.2	9.3	6.5	5.7	5.9	2.8	4.4	3.7
13	7.4	7.8	7.2	6.9	9.0	9.8	6.4	5.5	5.9	2.8	4.2	5.0
14	7.2	7.6	7.2	6.9	8.9	9.6	6.4	5.3	5.7	2.9	4.0	5.9
15	7.1	7.6	7.2	6.9	8.8	9.3	6.4	5.3	5.3	3.2	3.9	6.2
16	6.9	7.4	7.4	6.9	8.7	8.3	6.2	5.2	5.2	3.2	3.7	6.5
17	6.9	7.4	7.4	6.9	8.9	7.6	6.4	5.2	5.2	3.4	3.4	6.4
18	6.9	7.4	7.2	6.9	9.0	8.0	6.4	5.5	5.0	3.2	3.1	6.4
19	7.1	7.4	7.2	6.9	9.1	7.8	6.7	5.5	4.7	3.2	3.1	6.2
20	7.2	7.4	7.6	6.9	9.1	8.1	7.2	5.3	4.4	2.9	2.9	5.9
21	7.6	7.4	7.6	6.7	8.9	8.1	7.8	5.2	3.9	2.8	3.4	5.3
22	8.0	7.4	7.4	6.7	8.5	8.1	8.9	5.2	3.6	2.6	3.6	5.0
23	7.8	7.4	7.2	6.7	8.3	8.0	10	5.0	3.2	2.4	3.6	4.8
24	7.6	7.2	7.2	6.7	11	7.6	9.8	4.8	3.6	2.4	3.9	5.9
25	7.4	7.2	7.2	6.7	12	7.2	9.8	4.5	3.9	2.8	3.9	6.5
26	7.4	8.1	7.2	6.7	10	7.1	9.8	4.2	3.2	2.6	4.0	6.5
27	7.4	9.8	7.2	6.7	9.3	7.1	9.3	3.9	3.2	2.4	4.2	6.0
28	7.2	9.6	7.2	6.9	8.3	8.3	8.9	3.7	3.2	2.3	4.5	5.5
29	7.2	8.5	7.1	7.1	---	9.8	8.9	3.6	3.9	2.6	7.1	5.2
30	7.2	8.3	7.1	7.1	---	9.5	8.3	3.7	4.8	2.4	7.2	5.0
31	8.1	---	7.1	7.1	---	8.7	---	4.0	---	2.4	6.9	---
TOTAL	231.7	233.6	229.8	214.3	238.2	263.9	241.8	170.0	139.1	104.0	115.8	165.2
MEAN	7.47	7.79	7.41	6.91	8.51	8.51	8.06	5.48	4.64	3.35	3.74	5.51
MAX	9.0	9.8	8.1	7.1	12	11	10	7.8	5.9	6.4	7.2	7.2
MIN	6.7	7.2	7.1	6.7	7.1	7.1	6.2	3.6	3.2	2.3	2.1	3.7
CFSM	.58	.60	.57	.53	.66	.66	.62	.42	.36	.26	.29	.42
IN.	.66	.67	.66	.61	.68	.76	.69	.49	.40	.30	.33	.47

CAL YR 1976 TOTAL 3052.9 MEAN 8.34 MAX 16 MIN 5.7 CFSM .64 IN 8.74
WTR YR 1977 TOTAL 2347.4 MEAN 6.43 MAX 12 MIN 2.1 CFSM .50 IN 6.72

04106400 WEST FORK PORTAGE CREEK AT KALAMAZOO, MI

LOCATION.--Lat 42°14'40", long 85°36'50", in NE¼ sec.5, T.3 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank 30 ft (9 m) upstream from culvert on Oakland Drive, 2.5 mi (4.0 km) upstream from mouth, and 3.7 mi (6.0 km) southwest of main business district of Kalamazoo.

DRAINAGE AREA.--18.7 mi² (48.4 km²).

PERIOD OF RECORD.--September 1959 to current year.

GAGE.--Water-stage recorder and V-notch sharp-crested weir. Datum of gage is 858.09 ft (261.546 m) above mean sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 10.1 ft³/s (0.286 m³/s), 7.33 in/yr (186 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 41 ft³/s (1.16 m³/s) Apr. 19, 1975, gage height, 3.32 ft (1.012 m); minimum, 1.0 ft³/s (0.028 m³/s) Aug. 9, 1964; minimum gage height, 0.88 ft (0.268 m) July 30, 1963, caused by construction.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 20 ft³/s (0.57 m³/s) Mar. 9, gage height, 2.82 ft (0.860 m); minimum, 2.8 ft³/s (0.079 m³/s) Aug. 1, 2, 3; minimum gage height, 2.06 ft (0.628 m) Feb. 21, caused by siphon action.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	12	13	10	9.6	13	11	9.8	6.6	10	3.1	10
2	10	12	12	10	9.6	12	12	9.7	6.6	9.4	2.8	12
3	10	12	12	10	9.6	9.2	13	9.0	6.2	8.5	3.0	11
4	9.8	12	12	10	9.6	12	12	8.4	6.0	8.3	3.1	9.4
5	9.8	12	11	10	9.6	17	12	8.6	7.4	7.6	3.8	8.5
6	13	12	11	10	9.6	17	12	8.8	8.0	6.7	4.5	7.7
7	14	12	11	10	9.6	14	12	8.8	7.9	5.7	4.7	7.1
8	13	12	11	10	9.6	13	12	9.0	7.6	5.0	4.8	6.6
9	13	12	10	10	9.9	19	13	8.8	8.0	4.7	5.0	6.0
10	12	12	12	9.9	11	17	11	8.6	7.7	4.5	6.5	5.5
11	12	12	10	9.8	12	13	9.7	8.6	8.3	4.3	6.7	5.1
12	11	12	11	9.7	13	13	9.2	8.6	8.6	4.5	6.5	4.8
13	11	12	9.7	9.6	13	15	9.2	8.8	8.6	4.2	5.7	7.0
14	10	12	10	9.6	12	17	8.9	8.4	8.5	4.4	5.3	8.0
15	10	12	11	9.5	12	17	8.9	8.1	8.1	4.6	4.9	8.6
16	9.8	12	11	9.5	12	13	8.9	7.8	7.6	5.3	4.7	10
17	9.6	11	11	9.4	11	12	8.7	8.0	7.1	7.0	4.9	9.7
18	9.7	11	11	9.4	11	14	8.4	9.8	6.7	7.1	4.9	10
19	9.8	11	11	9.4	11	12	8.7	9.3	6.4	6.3	4.8	9.8
20	10	11	11	9.4	11	12	8.9	9.1	5.8	4.4	4.8	9.1
21	11	11	12	9.4	11	12	9.2	8.8	5.4	4.1	4.9	8.5
22	11	11	11	9.4	11	12	11	8.6	5.0	4.0	5.3	7.8
23	11	11	11	9.4	12	11	14	8.1	4.7	3.6	5.2	7.3
24	11	11	11	9.4	17	11	13	7.6	4.4	3.5	5.6	9.0
25	11	11	11	9.4	18	10	13	7.3	4.4	3.9	5.5	10
26	11	12	11	9.4	18	9.3	14	7.0	4.5	3.8	5.5	9.9
27	11	15	11	9.4	16	9.2	13	6.7	4.7	3.5	5.5	9.5
28	11	15	11	9.4	14	11	12	6.5	4.9	3.2	6.1	8.9
29	10	14	10	9.4	---	14	12	6.2	5.7	3.5	11	8.0
30	10	13	10	9.6	---	13	11	6.0	7.8	3.8	11	7.5
31	11	---	10	9.6	---	12	---	6.1	---	3.5	9.8	---
TOTAL	337.5	360	340.7	299.0	332.7	405.7	331.7	254.9	199.2	162.9	169.9	252.3
MEAN	10.9	12.0	11.0	9.65	11.9	13.1	11.1	8.22	6.64	5.25	5.48	8.41
MAX	14	15	13	10	18	19	14	9.8	8.6	10	11	12
MIN	9.6	11	9.7	9.4	9.6	9.2	8.4	6.0	4.4	3.2	2.8	4.8
CFSM	.58	.64	.59	.52	.64	.70	.59	.44	.36	.28	.29	.45
IN.	.67	.72	.68	.59	.66	.81	.66	.51	.40	.32	.34	.50

CAL YR 1976 TOTAL 4454.0 MEAN 12.2 MAX 25 MIN 7.8 CFSM .65 IN 8.86
WTR YR 1977 TOTAL 3446.5 MEAN 9.44 MAX 19 MIN 2.8 CFSM .51 IN 6.86

04106500 PORTAGE CREEK AT KALAMAZOO, MI

LOCATION.--Lat 42°16'27", long 85°34'35", in NW¼ NE¼ sec.27, T.2 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 50 ft (15 m) upstream from bridge on Reed Avenue in Kalamazoo, and 1.5 miles (2.4 km) upstream from mouth.

DRAINAGE AREA.--46.8 mi² (121.2 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1947 to September 1958, June 1975 to current year. Monthly discharge only for some periods, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 761.50 ft (232.105 m) above mean sea level (levels by Michigan Department of Natural Resources). Dec. 15, 1947, to Dec. 7, 1955, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good. Some regulation by millponds upstream from station. Flow includes water which is pumped from ground-water sources by industry and discharged into stream five miles above station.

AVERAGE DISCHARGE.--13 years (1947-58, 1976-77), 55.6 ft³/s (1.575 m³/s), 16.13 in/yr (410 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 580 ft³/s (16.4 m³/s) sometime in July 1954 from rating curve extended above 165 ft³/s (4.67 m³/s), gage height, 5.25 ft (1.600 m) caused by momentary gate opening of millpond; minimum, 2.0 ft³/s (0.057 m³/s) May 8, 1956, gage height, 1.50 ft (0.457 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 144 ft³/s (4.08 m³/s) Feb. 24; maximum gage height, 3.40 ft (1.036 m) Feb. 24, June 30; minimum discharge, 8.6 ft³/s (0.24 m³/s) Mar. 15, gage height, 1.70 ft (0.518 m); minimum daily, 20 ft³/s (0.57 m³/s) July 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	47	45	43	38	39	62	54	51	33	39	25	61
2	45	44	42	38	39	58	74	51	33	29	24	76
3	46	45	40	39	42	65	65	47	31	30	24	46
4	46	45	39	42	44	115	59	47	31	29	28	42
5	50	45	40	42	44	89	63	48	51	30	34	40
6	75	50	40	40	42	70	56	47	36	29	31	39
7	55	50	41	41	43	66	50	47	33	27	28	37
8	51	48	40	40	43	69	47	46	47	27	30	38
9	47	49	40	39	44	82	49	44	38	25	31	38
10	45	44	41	39	45	82	48	42	33	24	47	38
11	47	44	40	38	51	75	48	42	39	26	34	39
12	47	43	39	37	55	86	48	43	34	27	33	38
13	46	42	38	38	54	80	48	42	33	27	30	68
14	45	42	38	39	48	73	48	40	32	35	29	45
15	46	41	38	40	48	68	48	40	32	28	28	51
16	44	41	37	38	49	61	46	39	33	28	28	48
17	43	40	37	36	48	57	46	46	35	29	28	44
18	42	39	37	39	49	69	50	48	31	27	27	50
19	45	40	39	39	48	61	47	39	30	26	26	42
20	46	39	42	38	46	66	50	37	30	24	26	39
21	52	40	38	39	46	59	48	37	30	23	29	37
22	50	39	38	37	51	60	63	34	30	22	30	37
23	46	39	40	37	62	56	63	33	28	20	29	36
24	47	38	39	37	125	53	50	34	28	23	32	73
25	45	40	39	39	85	50	62	33	29	23	28	47
26	45	63	40	39	70	48	55	31	26	21	29	50
27	44	72	40	37	66	50	50	32	26	23	31	41
28	42	51	40	38	65	81	65	28	29	26	47	39
29	45	45	40	40	---	77	54	28	33	30	70	37
30	47	45	40	40	---	62	50	29	65	27	39	37
31	52	---	39	38	---	57	---	30	---	26	37	---
TOTAL	1473	1348	1224	1201	1491	2107	1604	1235	1019	830	992	1353
MEAN	47.5	44.9	39.5	38.7	53.3	68.0	53.5	39.8	34.0	26.8	32.0	45.1
MAX	75	72	43	42	125	115	74	51	65	39	70	76
MIN	42	38	37	36	39	48	46	28	26	20	24	36

CAL YR 1976 TOTAL 20002 MEAN 54.7 MAX 176 MIN 37
WTR YR 1977 TOTAL 15877 MEAN 43.5 MAX 125 MIN 20

04106500 PORTAGE CREEK AT KALAMAZOO, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: August 1975 to current year.

INSTRUMENTATION.--Digital temperature recorder since August 1975.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES (water year 1977): Maximum recorded, 27.0°C July 21, 1977; minimum, 0.0°C Dec. 31, 1976, Jan. 1, 2, 1977.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 27.0°C July 21; minimum, 0.0°C Dec. 31, Jan. 1, 2.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	17.5	14.5	16.5	8.5	6.5	7.5	---	---	---	.5	.0	.0
2	17.0	15.5	16.5	9.0	7.0	8.0	---	---	---	1.5	.0	.5
3	17.0	14.5	16.0	8.5	6.5	8.0	3.0	2.5	3.0	1.5	1.0	1.0
4	18.5	15.0	16.5	8.0	6.0	7.5	4.0	3.5	3.5	---	---	---
5	18.5	15.5	17.5	7.5	5.0	6.5	4.5	3.0	3.5	---	---	---
6	17.0	12.5	14.0	7.5	4.0	5.0	6.0	4.5	5.0	---	---	---
7	13.0	12.0	12.5	7.0	3.0	4.5	6.0	5.0	5.5	---	---	---
8	13.0	12.0	12.5	6.5	1.5	4.0	5.0	4.5	5.0	---	---	---
9	12.5	11.0	11.5	8.0	5.0	6.0	5.5	4.5	5.0	---	---	---
10	11.0	10.5	10.5	7.5	4.5	6.0	7.5	5.5	6.5	---	---	---
11	13.5	10.0	11.5	6.0	4.0	5.0	6.0	3.5	4.5	---	---	---
12	15.5	13.0	14.0	7.5	3.5	5.0	3.5	2.5	3.0	---	---	---
13	15.5	13.5	14.5	8.5	2.5	4.5	4.5	1.5	3.0	---	---	---
14	13.5	11.0	12.0	3.5	1.0	2.0	6.0	4.5	5.5	---	---	---
15	13.0	11.0	12.0	3.5	2.0	2.5	8.0	6.0	7.0	---	---	---
16	12.5	8.0	11.0	5.0	3.5	4.5	7.5	6.5	7.0	---	---	---
17	10.0	8.5	9.5	---	---	---	8.0	7.0	7.5	---	---	---
18	10.0	8.0	9.0	---	---	---	7.5	4.5	6.0	---	---	---
19	10.0	9.0	9.5	6.5	5.5	6.0	6.5	4.0	5.0	---	---	---
20	10.5	9.0	10.0	5.5	3.0	4.5	6.5	5.0	6.0	---	---	---
21	10.0	8.0	9.0	5.0	1.5	3.0	4.5	3.0	4.0	---	---	---
22	8.0	7.5	7.5	3.5	1.0	2.0	4.0	2.5	3.0	---	---	---
23	7.5	6.5	7.0	4.0	1.5	2.5	3.0	1.5	2.5	---	---	---
24	8.0	7.0	7.5	3.0	1.5	2.5	2.5	1.0	1.5	---	---	---
25	9.0	8.0	8.5	---	---	---	3.0	1.0	2.0	---	---	---
26	8.5	8.0	8.0	---	---	---	3.0	2.0	3.0	---	---	---
27	8.0	7.0	7.5	---	---	---	3.0	1.0	2.0	3.0	1.5	2.0
28	8.0	5.5	7.0	---	---	---	4.0	3.0	3.5	2.5	1.0	1.5
29	8.5	6.5	7.5	---	---	---	3.0	.5	1.5	1.5	1.0	1.0
30	9.5	7.5	8.5	---	---	---	2.0	.5	1.0	1.0	1.0	1.0
31	8.5	7.5	8.0	---	---	---	1.5	.0	.5	1.5	1.0	1.0
MONTH	18.5	5.5	11.0	9.0	1.0	5.0	8.0	.0	4.0	3.0	.0	1.0

04106500 PORTAGE CREEK AT KALAMAZOO, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	4.5	2.5	3.5	7.5	5.0	6.5	13.0	10.0	11.5	16.0	13.5	14.5
2	5.5	4.5	5.0	8.0	5.5	7.0	13.5	10.5	11.5	16.5	15.5	16.0
3	5.5	5.0	5.0	8.0	6.5	7.5	13.5	8.5	11.0	18.0	15.0	16.5
4	6.5	4.5	5.5	7.5	5.5	6.5	11.0	9.5	10.0	18.0	16.0	16.5
5	5.0	3.5	4.0	5.5	4.0	4.5	10.5	8.0	9.0	21.0	15.5	18.0
6	5.0	3.0	4.0	5.5	4.5	5.0	8.5	5.5	7.5	21.0	17.5	19.5
7	4.5	3.0	3.5	9.0	4.5	7.0	11.0	8.0	9.5	19.0	15.5	17.5
8	5.0	4.0	4.5	10.5	7.5	9.0	10.0	7.0	8.5	17.0	14.0	15.5
9	7.5	4.5	5.5	10.0	8.0	9.5	11.0	7.0	9.0	16.0	12.0	14.5
10	11.5	7.0	8.0	12.0	8.5	10.5	15.0	9.0	12.0	17.0	13.5	15.5
11	9.0	4.0	7.5	13.0	10.5	12.0	18.5	13.5	16.0	18.5	15.5	17.0
12	11.5	.5	6.0	13.0	10.0	11.5	19.5	16.5	18.0	19.5	17.0	18.0
13	17.5	4.0	9.0	11.5	9.5	10.0	19.0	17.0	18.0	22.0	17.0	19.5
14	6.0	3.5	5.0	10.5	8.5	9.5	18.0	16.0	17.0	21.5	19.0	20.0
15	5.0	4.0	4.5	13.0	9.5	11.5	18.0	14.5	16.0	20.5	17.0	19.0
16	4.0	3.0	4.0	12.5	9.5	11.0	19.0	16.0	17.5	23.0	17.5	20.5
17	5.5	3.0	4.0	11.0	8.0	9.5	21.0	18.0	19.5	24.0	21.5	22.5
18	6.5	5.5	6.0	8.0	6.0	6.5	21.5	18.0	19.5	24.5	20.5	22.5
19	7.0	5.5	6.0	8.5	6.5	7.5	20.5	18.5	19.0	25.0	22.0	23.5
20	6.5	5.0	5.5	8.0	5.0	6.0	21.5	16.5	19.0	25.5	22.5	24.5
21	5.0	3.5	4.5	8.5	5.0	6.5	21.0	17.5	19.0	25.0	22.5	24.0
22	8.5	4.0	6.0	9.5	6.0	8.0	18.0	14.0	16.5	25.0	22.0	23.5
23	9.0	7.5	8.5	9.0	8.0	8.0	14.5	12.5	13.5	24.5	22.0	23.5
24	11.5	7.0	9.5	10.0	6.0	8.0	13.5	11.5	12.5	25.5	22.5	24.0
25	6.5	3.5	4.5	11.0	7.5	9.5	11.5	10.0	10.5	26.5	22.5	24.5
26	5.5	4.0	4.5	11.0	8.5	10.0	15.5	10.0	12.5	25.0	22.5	24.0
27	4.5	3.0	3.5	11.5	8.5	10.0	17.0	13.5	15.0	24.5	22.0	23.5
28	7.0	3.0	5.0	12.5	11.0	11.5	16.5	13.5	14.5	23.5	21.0	22.5
29	---	---	---	15.5	11.5	13.5	16.0	13.0	14.0	22.0	19.5	20.5
30	---	---	---	15.5	13.5	14.5	16.0	13.5	15.0	22.0	17.5	20.0
31	---	---	---	14.0	10.5	11.5	---	---	---	23.0	18.0	21.0
MONTH	17.5	.5	5.5	15.5	4.0	9.0	21.5	5.5	14.0	26.5	12.0	20.0
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	22.0	18.5	20.0	22.0	17.5	19.5	23.0	19.5	21.0	23.5	21.5	22.5
2	18.5	16.5	17.0	22.0	19.0	21.0	22.0	19.0	20.0	22.0	20.0	21.0
3	20.5	16.0	18.0	21.5	19.0	20.5	23.5	19.5	21.5	21.5	19.0	20.5
4	21.0	18.5	19.5	25.0	19.5	22.0	25.0	21.0	23.0	21.5	18.5	20.0
5	21.0	19.0	20.0	24.5	22.5	23.5	24.5	21.0	22.5	21.5	19.0	20.5
6	20.5	17.0	18.5	---	---	---	23.0	20.5	22.5	22.0	17.5	19.5
7	17.5	14.5	16.5	---	---	---	23.0	21.0	22.0	22.5	19.0	20.5
8	17.5	14.5	16.0	---	---	---	23.5	22.0	22.5	22.0	20.0	20.5
9	19.5	15.0	17.0	---	---	---	23.5	21.0	22.0	21.0	18.5	20.0
10	20.5	17.0	19.0	---	---	---	25.5	21.5	23.0	18.5	16.5	17.5
11	19.5	16.0	18.0	---	---	---	25.0	20.0	22.0	18.5	16.0	17.5
12	17.0	16.5	17.0	---	---	---	22.0	18.5	20.0	18.0	17.0	17.5
13	18.0	15.0	16.5	---	---	---	22.5	18.5	21.0	17.0	15.0	16.0
14	22.0	16.5	19.0	---	---	---	23.5	21.5	22.5	18.0	15.0	16.5
15	24.0	19.5	22.0	---	---	---	24.0	19.5	22.0	18.5	15.5	17.0
16	25.5	21.0	22.5	---	---	---	23.5	21.5	22.5	18.5	15.5	17.0
17	26.0	22.5	24.5	---	---	---	23.5	20.5	21.5	19.5	18.0	19.0
18	25.5	22.5	23.5	---	---	---	23.0	19.0	20.5	19.5	17.0	18.5
19	23.0	19.0	21.5	---	---	---	21.0	18.0	20.0	20.5	18.5	19.5
20	24.0	19.5	22.0	---	---	---	22.5	19.0	20.5	19.0	17.5	18.0
21	23.5	20.0	22.0	27.0	26.0	27.0	20.5	19.0	20.0	17.5	16.0	17.0
22	24.5	20.0	22.5	26.5	22.0	23.5	22.0	18.5	19.5	19.5	17.0	18.0
23	24.5	21.5	23.0	26.0	21.5	23.5	21.5	20.0	20.5	19.0	18.0	18.5
24	26.0	22.0	24.0	23.0	20.5	22.0	21.5	18.5	20.0	18.5	16.5	17.5
25	26.5	23.0	25.0	25.0	20.5	22.0	21.0	17.5	20.0	18.0	15.0	16.5
26	26.5	22.5	24.5	24.0	20.0	21.5	22.0	18.0	20.0	19.0	15.5	17.5
27	26.0	23.0	25.0	23.0	18.5	20.5	25.5	20.5	23.5	18.0	16.0	17.0
28	26.0	22.0	25.0	22.5	18.5	20.5	25.5	23.0	24.0	17.0	14.5	15.5
29	24.5	20.5	23.0	21.0	19.5	20.5	23.0	20.5	22.0	16.5	14.0	15.0
30	24.0	18.5	20.5	23.0	19.0	21.0	23.0	19.0	21.5	16.0	14.5	15.0
31	---	---	---	24.0	19.0	22.0	24.5	20.5	22.5	---	---	---
MONTH	26.5	14.5	21.0	27.0	17.5	22.0	25.5	17.5	21.5	23.5	14.0	18.0

04108500 KALAMAZOO RIVER NEAR FENNVILLE, MI

LOCATION.--Lat 42°35'36", long 85°59'03", in NE¼ sec.5, T.2 N., R.14 W., Allegan County, Hydrologic Unit 04050003, on left bank 40 ft (12 m) upstream from bridge on State Highway 89, 2.1 mi (3.4 km) downstream from Swan Creek, 4.0 mi (6.4 km) downstream from Calkins Dam, and 6.1 mi (9.8 km) east of Fennville.

DRAINAGE AREA.--1,600 mi² (4,144 km²), approximately.

PERIOD OF RECORD.--April 1929 to September 1936, October 1937 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "near Allegan" April 1929 to September 1932; as "at Calkins Bridge, near Allegan" October 1932 to September 1936, October 1937 to September 1938; as "at Calkins Dam, near Allegan" October 1938 to September 1950.

REVISED RECORDS.--WSP 1387: 1929(M), 1930, 1933, 1934-36(M), 1938(M), 1939-40, 1942.

GAGE.--Water-stage recorder. Datum of gage is 586.51 ft (178.768 m) above mean sea level (levels by Michigan Department of Natural Resources). April 1929 to September 1936 at bridge and October 1937 to September 1950 in powerplant, 4.0 mi (6.4 km) upstream at mean sea level datum (levels by city of Allegan).

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated at low and medium stages by powerplants upstream from station and since June 1936, by Calkins Dam and powerplant, 4.0 mi (6.4 km) upstream from station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--47 years, 1,383 ft³/s (39.17 m³/s), 11.74 in/yr (298 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 17,500 ft³/s (496 m³/s) Apr. 11, 1947, gage height, 606.76 ft (184.940 m), site and datum then in use; minimum daily, 50 ft³/s (1.42 m³/s) Aug. 19, 1976, caused by shutting off flow at Calkins Dam.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,550 ft³/s (129 m³/s) Mar. 12, gage height, 11.70 ft (3.566 m); minimum, 98 ft³/s (2.78 m³/s) July 31, gage height, 3.08 ft (0.939 m); minimum daily, 143 ft³/s (4.05 m³/s) July 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1060	1460	1090	913	740	1880	2410	1550	1040	823	924	890
2	1060	1080	940	816	900	1880	2520	1840	1070	1160	923	1520
3	946	1090	1600	949	1080	2170	3150	2170	1070	1280	689	1020
4	824	1140	1740	1030	1110	2160	3190	1480	1060	842	672	951
5	870	1140	982	969	1100	2430	2780	1630	1060	821	557	884
6	894	1140	1220	1130	1050	2630	2510	1520	718	819	621	888
7	1420	1140	1230	1170	880	2840	2500	1150	994	817	586	888
8	1860	1140	1240	1140	1000	2710	2440	1140	1000	814	653	878
9	1050	1140	1230	1200	1390	2990	2420	1470	1030	811	1030	734
10	887	1080	1370	1150	1390	3730	2400	1790	1390	795	648	704
11	1420	918	1350	940	1470	3690	2330	1460	1390	763	647	725
12	1520	1330	877	830	1340	4150	2250	1100	1070	757	640	726
13	1160	1420	1190	860	845	2990	2240	1030	1060	753	955	787
14	1200	913	1280	1000	863	2610	2160	1100	1060	745	971	955
15	912	907	1240	1100	1050	2720	1350	1100	1050	766	967	1060
16	894	1200	1120	1120	1240	2700	929	1070	1010	764	966	1060
17	1170	1230	817	1090	1230	2530	1350	873	987	744	727	1470
18	1510	1110	936	1020	1230	2500	1830	1110	749	755	744	1660
19	1090	1190	1180	1000	1220	2490	1630	1120	773	747	741	1100
20	886	908	1270	1050	1170	2450	933	1110	804	751	749	1090
21	873	894	831	1200	1110	2410	1520	1080	800	743	595	1090
22	899	1200	974	1120	1100	2450	2040	1040	796	712	562	1090
23	931	925	1160	1020	1170	2400	1850	1030	790	732	746	1080
24	1220	1260	1030	800	1280	2310	1840	874	788	731	747	1260
25	1220	1160	769	960	1700	2170	1850	541	793	521	739	1620
26	1130	1140	810	1200	2180	1970	1850	540	794	798	723	1100
27	1220	1160	976	1200	2210	1950	1880	559	792	793	688	1380
28	1220	1150	1160	880	2160	1950	2070	754	791	526	726	1690
29	1140	1500	1130	940	---	2110	2260	744	804	698	1500	1140
30	916	1840	956	700	---	2260	2010	772	817	143	582	1070
31	1340	---	880	710	---	2400	---	895	---	524	180	---
TOTAL	34742	34905	34578	31207	35208	78630	62492	35642	28350	23448	23178	32510
MEAN	1121	1164	1115	1007	1257	2536	2083	1150	945	756	748	1084
MAX	1860	1840	1740	1200	2210	4150	3190	2170	1390	1280	1500	1690
MIN	824	894	769	700	740	1880	929	540	718	143	168	704
CFSM	.70	.73	.70	.63	.79	1.59	1.30	.72	.59	.47	.47	.68
IN.	.81	.81	.80	.73	.82	1.83	1.45	.83	.66	.55	.54	.76

CAL YR 1976 TOTAL 642505 MEAN 1755 MAX 5330 MIN 50 CFSM 1.10 IN 14.94
WTR YR 1977 TOTAL 454890 MEAN 1246 MAX 4150 MIN 143 CFSM .78 IN 10.58

04108600 RABBIT RIVER NEAR HOPKINS, MI

LOCATION.--Lat 42°38'32", long 85°43'19", in SE¼ sec.16, T.3 N., R.12 W., Allegan County, Hydrologic Unit 04050003, on left bank at downstream side of bridge on 18th Street, 2.5 mi (4.0 km) northeast of Hopkins.

DRAINAGE AREA.--71.4 mi² (184.9 km²).

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 700 ft (213 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--12 years, 55.1 ft³/s (1.560 m³/s), 10.48 in/yr (266 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,000 ft³/s (28.3 m³/s) Dec. 15, 1975, gage height, 8.62 ft (2.627 m); maximum gage height, 8.66 ft (2.640 m) Dec. 31, 1972; minimum discharge not determined; minimum daily, 9.2 ft³/s (0.26 m³/s) Aug. 27, 28, 1970, Sept. 18, 1971; minimum gage height, 1.89 ft (0.576 m) Aug. 28, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 290 ft³/s (8.21 m³/s) Apr. 3, gage height, 6.80 ft (2.073 m); maximum gage height, 7.01 ft (2.137 m) Mar. 5, backwater from ice; no peak discharge above base of 300 ft³/s (8.50 m³/s); minimum, 10 ft³/s (0.28 m³/s) Aug. 28, gage height, 1.89 ft (0.576 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	28	33	20	19	54	64	39	41	20	13	21
2	17	26	31	21	20	50	115	37	34	18	12	28
3	17	25	30	21	21	50	258	35	27	17	12	24
4	16	24	28	21	21	90	170	33	23	18	12	20
5	16	24	27	21	21	170	116	37	26	17	12	20
6	23	24	26	21	21	190	93	36	34	16	13	19
7	31	23	25	21	20	160	80	32	34	16	13	18
8	26	22	24	21	21	160	71	30	27	16	14	17
9	23	22	23	21	22	160	64	28	25	15	14	17
10	22	22	23	21	22	155	59	27	23	15	15	16
11	21	23	22	21	23	155	55	26	23	15	15	15
12	20	22	22	21	24	150	50	25	24	15	15	15
13	20	22	21	21	25	143	48	24	23	14	14	17
14	19	22	21	22	25	123	46	23	22	14	13	21
15	19	21	20	24	24	98	43	23	20	14	13	19
16	19	21	20	23	23	79	42	22	19	13	13	24
17	19	22	20	22	22	67	40	21	19	14	14	22
18	19	22	19	22	25	64	39	24	34	14	13	23
19	20	22	19	22	26	68	37	22	29	13	12	24
20	21	22	19	22	27	81	45	21	25	13	12	22
21	21	22	19	22	26	81	76	20	22	12	12	20
22	23	22	18	22	25	82	70	20	20	13	12	19
23	23	21	18	22	33	86	62	20	19	13	12	20
24	23	21	18	22	45	73	52	19	19	12	12	36
25	23	21	18	20	55	63	58	19	18	13	12	58
26	23	23	18	19	50	59	76	18	18	13	11	42
27	22	32	18	18	58	56	60	18	17	12	11	32
28	22	35	18	18	59	65	49	18	17	12	11	27
29	22	35	18	18	---	142	45	17	16	13	27	24
30	23	34	19	18	---	107	41	17	17	16	26	23
31	28	---	19	18	---	78	---	26	---	14	19	---
TOTAL	659	725	674	646	803	3159	2124	777	715	450	429	703
MEAN	21.3	24.2	21.7	20.8	28.7	102	70.8	25.1	23.8	14.5	13.8	23.4
MAX	31	35	33	24	59	190	258	39	41	20	27	58
MIN	16	21	18	18	19	50	37	17	16	12	11	15
CFSM	.30	.34	.30	.29	.40	1.43	.99	.35	.33	.20	.19	.33
IN.	.34	.38	.35	.34	.42	1.65	1.11	.40	.37	.23	.22	.37

CAL YR 1976 TOTAL 21561 MEAN 58.9 MAX 518 MIN 14 CFSM .83 IN 11.23
WTR YR 1977 TOTAL 11864 MEAN 32.5 MAX 258 MIN 11 CFSM .46 IN 6.18

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI
(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 42°38'50", long 86°11'53", in NE¼ sec.16, T.3 N., R.16 W., Allegan County, Hydrologic Unit 04050003, at bridge on Old US-31 between Saugatuck and Douglas, 7.9 mi (12.7 km) downstream from Rabbit River, 17.6 mi (28.3 km) downstream from gaging station near Fennville and 2.9 mi (4.7 km) upstream from mouth.

DRAINAGE AREA.--2,020 mi² (5,230 km²), approximately.

PERIOD OF RECORD.--Water years 1974 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1974 to current year.
WATER TEMPERATURES: May 1975 to current year.

INSTRUMENTATION.--Water quality monitor since Nov. 1, 1975.

REMARKS.--Water quality monitor located 30 ft (9 m) from the right abutment of the bridge. Monthly samples are collected as a cross-section sample at the upstream side of the bridge. Water discharge measurements are made at times of monthly sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1974, 1975, 1977): Maximum recorded, 666 micromhos Nov. 25, 30, Dec. 2, 1976; minimum recorded, 200 micromhos Sept. 24, 1977.
WATER TEMPERATURES: Maximum recorded (water year 1977), 31.5°C July 20, 1977, minimum, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UM-MF (COL./100 ML)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)
OCT												
07...	1030	1260	579	7.9	13.0	8.2	79	3000	210	--	250	29
NOV												
10...	1400	1530	612	8.0	3.5	10.1	77	8140	850	95	270	40
DEC												
08...	1400	--	640	7.6	.0	13.7	93	4400	8230	130	260	30
JAN												
11...	1130	E1480	627	7.8	.0	12.7	87	81200	116	86	280	34
FEB												
08...	1500	E1000	659	7.8	.0	13.9	96	81300	869	940	--	--
MAR												
07...	1430	3090	526	7.7	2.0	12.8	93	8300	888	2100	220	56
APR												
04...	1400	3010	524	7.9	9.0	9.8	88	8950	820	240	240	51
MAY												
02...	1530	1800	528	8.0	17.0	12.5	130	7400	828	41	260	46
JUN												
06...	1430	478	574	8.0	21.0	7.6	85	>80000	760	2300	250	37
JUL												
11...	1530	1220	534	8.3	25.0	12.4	149	83000	55	836	240	43
AUG												
01...	1430	827	601	8.6	25.0	7.6	92	42000	8180	50	220	34
SEP												
12...	1530	1340	550	8.4	19.5	9.2	101	819000	8200	150	250	50

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
OCT												
07...	65	21	26	.7	2.3	270	0	221	5.4	46	40	.2
NOV												
10...	69	23	24	.6	2.1	280	0	230	4.5	50	36	.2
DEC												
08...	68	22	24	.6	2.0	280	0	230	11	52	35	.2
JAN												
11...	74	24	23	.6	2.0	300	0	246	7.6	50	39	.2
FEB												
08...	--	--	17	--	--	290	0	238	7.4	46	39	.2
MAR												
07...	60	17	18	.5	2.9	200	0	164	6.4	54	30	.2
APR												
04...	63	19	16	.5	2.2	230	0	189	4.6	53	28	.2
MAY												
02...	71	20	18	.5	2.2	260	0	210	4.2	48	28	.1
JUN												
06...	64	21	24	.7	2.2	260	0	213	4.2	50	37	.1
JUL												
11...	58	22	12	.3	2.2	240	0	197	1.9	36	43	.2
AUG												
01...	55	19	23	.7	2.2	210	8	186	.9	37	39	.1
SEP												
12...	64	22	26	.7	2.5	240	2	200	1.8	55	38	.2

E--ESTIMATED VALUE

B--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	SUS-PENDED SEDI-MENT (MG/L)	SUS-PENDED SEDI-MENT DIS-CHARGE (T/DAY)	SUS. SED. SIEVE DIAM. % FINER THAN .062 MM
OCT											
07...	6.8	340	340	1160	.64	1.3	5.9	.14	14	48	100
NOV											
10...	7.6	347	350	1430	.70	1.4	6.1	.08	5	21	100
DEC											
08...	7.9	345	349	--	.90	1.9	8.2	.09	12	--	100
JAN											
11...	10	367	370	2320	.88	1.9	8.2	.09	1	6.3	100
FEB											
08...	10	369	--	--	.90	1.9	8.3	.09	10	E27	100
MAR											
07...	7.4	309	288	2580	1.7	2.9	13	.11	14	117	100
APR											
04...	5.4	335	300	2720	1.0	2.0	8.9	.09	21	171	100
MAY											
02...	5.1	343	321	1670	.47	1.7	7.4	.11	12	58	100
JUN											
06...	5.5	337	332	435	.78	2.6	11	.19	32	41	100
JUL											
11...	.8	349	292	1150	.14	1.8	8.1	.20	14	46	100
AUG											
01...	3.5	310	290	692	.27	1.8	7.8	.24	20	45	100
SEP											
12...	2.0	331	330	1200	.58	1.8	7.9	.19	24	87	100

DATE	TIME	TOTAL ARSENIC (AS) (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	TOTAL CAD-MIUM (CD) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	TOTAL CHRO-MIUM (CR) (UG/L)	DIS-SOLVED CHRO-MIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	TOTAL IRON (FE) (UG/L)
OCT												
07...	1030	3	2	1	1	<10	<10	0	0	0	0	460
JAN												
11...	1130	2	2	1	1	10	<10	1	0	10	0	440
APR												
04...	1400	1	0	0	0	10	<10	0	0	10	0	950
JUL												
11...	1530	4	2	3	0	20	0	0	0	9	4	600

DATE	DIS-SOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	TOTAL MAN-GANESE (MN) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	TOTAL SELE-NIUM (SE) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	TOTAL ZINC (ZN) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	TOTAL ORGANIC CARBON (C) (MG/L)
OCT												
07...	40	13	4	90	20	<.5	<.5	0	0	10	0	7.4
JAN												
11...	90	9	3	130	110	<.5	<.5	0	0	20	--	8.1
APR												
04...	120	7	3	110	50	<.5	<.5	0	0	20	--	8.3
JUL												
11...	30	34	5	90	0	.0	.0	0	0	70	10	7.5

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	TOTAL ALDRIN (UG/L)	ALDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ATRAZINE (UG/L)	ATRAZINE IN BOTTOM MATERIAL (UG/KG DRY SOLIDS)	TOTAL CHLORDANE (UG/L)	CHLORDANE IN BOTTOM MATERIAL (UG/KG)	TOTAL DDD (UG/L)	DDD IN BOTTOM MATERIAL (UG/KG)	TOTAL DDE (UG/L)
NOV										
10...	1400	ND	--	ND	--	ND	--	ND	--	ND
FEB										
08...	1500	ND	--	ND	--	ND	--	ND	--	ND
MAY										
02...	1530	ND	ND	ND	ND	ND	ND	ND	ND	ND
AUG										
01...	1430	ND	--	ND	--	ND	--	ND	--	ND

DATE	DDE IN BOTTOM MATERIAL (UG/KG)	TOTAL DDT (UG/L)	DDT IN BOTTOM MATERIAL (UG/KG)	TOTAL DIAZINON (UG/L)	DIAZINON IN BOTTOM MATERIAL (UG/KG)	TOTAL DIELDRIN (UG/L)	DIELDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ENDRIN (UG/L)	ENDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ETHION (UG/L)
NOV										
10...	--	ND	--	ND	--	ND	--	ND	--	ND
FEB										
08...	--	ND	--	ND	--	ND	--	ND	--	ND
MAY										
02...	ND	ND	ND	--	ND	ND	ND	ND	ND	--
AUG										
01...	--	ND	--	ND	--	ND	--	ND	--	ND

DATE	ETHION IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR (UG/L)	HEPTACHLOR IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR EPOXIDE (UG/L)	HEPTACHLOR EPOXIDE IN BOTTOM MATERIAL (UG/KG)	TOTAL LINDANE (UG/L)	LINDANE IN BOTTOM MATERIAL (UG/KG)	TOTAL MALATHION (UG/L)	MALATHION IN BOTTOM MATERIAL (UG/KG)	TOTAL METHOXYCHLOR (UG/L)
NOV										
10...	--	ND	--	ND	--	ND	--	ND	--	ND
FEB										
08...	--	ND	--	ND	--	ND	--	ND	--	ND
MAY										
02...	ND	ND	ND	ND	ND	ND	ND	--	ND	ND
AUG										
01...	--	ND	--	ND	-	ND	--	ND	--	ND

DATE	METHOXYCHLOR IN BOTTOM MATERIAL (UG/KG)	TOTAL METHYL PARATHION (UG/L)	METHYL PARATHION IN BOTTOM MATERIAL (UG/KG)	TOTAL METHYL TRITHION (UG/L)	METHYL TRITHION IN BOTTOM MATERIAL (UG/KG)	TOTAL PARATHION (UG/L)	PARATHION IN BOTTOM MATERIAL (UG/KG)	SIMAZINE TOTAL COULSON COND. (UG/L)	SIMAZINE IN BOTTOM MATERIAL (UG/KG DRY SOLIDS)	TOTAL TOXAPHENE (UG/L)
NOV										
10...	--	ND	--	ND	--	ND	--	ND	--	ND
FEB										
08...	--	ND	--	ND	--	ND	--	ND	--	ND
MAY										
02...	ND	--	ND	--	ND	--	ND	ND	ND	ND
AUG										
01...	--	ND	--	ND	--	ND	--	ND	--	ND

DA	TOXAPHENE IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	TRITHION IN BOTTOM MATERIAL (UG/KG)	TOTAL 2,4-D (UG/L)	2,4-D IN BOTTOM MATERIAL (UG/KG)	TOTAL 2,4,5-T (UG/L)	2,4,5-T IN BOTTOM MATERIAL (UG/KG)	TOTAL SILVEX (UG/L)	SILVEX IN BOTTOM MATERIAL (UG/KG)
NOV									
10...	--	ND	--	ND	--	ND	--	ND	--
FEB									
08...	--	ND	--	ND	--	ND	--	ND	--
MAY									
02...	ND	--	ND	ND	ND	ND	ND	ND	ND
AUG									
01...	--	ND	--	ND	--	ND	--	ND	--

ND--NOT DETECTED

STREAMS TRIBUTARY TO LAKE MICHIGAN

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

PERIPHYTON

DATE	LENGTH OF EXPOSURE (DAYS)	BIOMASS CHLOROPHYLL RATIO PERIPHYTON (UNITS)	PERIPHYTON BIOMASS ASH WEIGHT G/SQ M	PERIPHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)	CHLOR-B PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)
AUG 01...	21	1519	34.5	44.6	0.65	2.77

IDENTIFICATION OF PHYTOPLANKTON

DATE	OCT 7.76	NOV 10.76	DEC 8.76	JAN 11.77	FEB 8.77
TIME	1030	1400	1400	1130	1500
TOTAL CELLS/ML	20000	7700	6000	1400	2400
DIVERSITY: DIVISION	1.0	1.2	0.6	0.6	0.5
.CLASS	1.0	1.2	0.6	0.6	0.6
..ORDER	1.2	1.4	1.3	0.7	0.6
...FAMILY	1.5	1.6	1.4	0.8	1.6
....GENUS	2.4	2.4	1.5	1.6	1.6

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	*	0	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	430	2	300	4	--	-	*	0	--	-
....CHODATELLA	--	-	--	-	--	-	--	-	--	-
....CLOSTERIOPSIS	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	430	2	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
....QUADRIGULA	--	-	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	1100	6	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	270	4	12	1	29	1
....SCENEDESMUS	7100*	35	190	3	*	0	23	2	--	-
....TETRASTRUM	570	3	100	1	--	-	--	-	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	91	1	--	-	*	0	--	-
....CHLOROGONIUM	--	-	--	-	--	-	--	-	--	-
...PHACOTACEAE										
....PHACOTUS	--	-	--	-	--	-	--	-	--	-
....PTEROMONAS	--	-	--	-	--	-	--	-	--	-
...VOLVOCACEAE										
....PANDORINA	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....ARTHRODESMUS	--	-	--	-	--	-	--	-	--	-
....STAURASTRUM	--	-	--	-	--	-	--	-	--	-
..CHLOROCOCCALES										
...OOCYSTACEAE										
....GLOEOACTINIUM	--	-	--	-	--	-	--	-	--	-

04104690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE / TIME	OCT 7,76 1030		NOV 10,76 1400		DEC 8,76 1400		JAN 11,77 1130		FEB 8,77 1500	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	4400#	22	*	0	--	-	17	1	*	0
....MELOSIRA	5400#	26	420	5	84	1	29	2	63	3
....STEPHANODISCUS	--	-	690	9	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	140	1	--	-	--	-	*	0	--	-
....COCCONEIS	--	-	*	0	*	0	*	0	*	0
....RHOICOSPHENIA	--	-	*	0	--	-	--	-	*	0
...DIATOMACEAE										
....DIATOMA	--	-	*	0	--	-	--	-	--	-
....OPEPHORA	--	-	--	-	--	-	--	-	--	-
...EUNOTIACEAE										
....EUNOTIA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	*	0	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	*	0	*	0
....SYNEDRA	--	-	*	0	--	-	*	0	*	0
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	--	-	*	0	--	-
...NAVICULACEAE										
....ANOMOEONEIS	--	-	--	-	--	-	--	-	*	0
....GYROSIGMA	--	-	--	-	--	-	*	0	--	-
....NAVICULA	710	3	130	2	67	1	32	2	59	2
....PINNULARIA	--	-	--	-	*	0	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	140	1	91	1	51	1	14	1	29	1
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	--	-	39	1	--	-	--	-	--	-
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	--	-
....OCHROMONAS	--	-	--	-	--	-	*	0	*	0
...SYNURACEAE										
....SYNURA	--	-	*	0	--	-	--	-	--	-
.XANTHOPHYCEAE										
..HETEROCOCCALES										
...CENTRITRACTACEAE										
....CENTRITRACTUS	--	-	--	-	--	-	--	-	--	-
...CHLOROTHECIACEAE										
....OPHIOCYTIUM	--	-	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCOCCALES										
...CHROCOCCACEAE										
....ANACYSTIS	--	-	--	-	1200#	19	--	-	--	-
..HORMOGONALES										
...OSCILLATORIACEAE										
....LYNGBYA	--	-	3600#	47	84	1	960#	69	--	-
....OSCILLATORIA	--	-	1900#	24	4200#	70	280#	20	820#	34
....SPIRULINA	--	-	--	-	--	-	--	-	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	1400#	57
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	*	0
...CRYPTOMONODACEAE										
....CRYPTOMONAS	--	-	65	1	51	1	--	-	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	*	0	*	0	*	0	--	-
....PHACUS	--	-	*	0	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	--	-	*	0	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAY 2,77 1530		JUN 6,77 1430		JUL 11, 1530		AUG 1,77 1430		SEP 12,77 1530	
TOTAL CELLS/ML	38000		42000		91000		65000		49000	
DIVERSITY: DIVISION	1.9		1.6		1.5		0.9		1.3	
.CLASS	2.3		1.6		1.5		1.0		1.4	
..ORDER	2.7		2.0		2.0		1.2		1.5	
...FAMILY	3.4		2.5		3.0		1.8		2.1	
....GENUS	3.9		3.1		3.5		2.3		3.0	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	290	1	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	*	0	--	-	--	-	3000	5	3900	8
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	2300	5	12000	13	*	0	*	0
...MICRACTINIACEAE										
....GOLENKINIA	260	1	--	-	1200	1	--	-	--	-
....MICRACTINIUM	3100	8	--	-	9300	10	--	-	*	0
...OOCYSTACEAE										
....ANKISTRODESMUS	3300	9	--	-	*	0	1700	3	360	1
....CHODATELLA	--	-	860	2	1500	2	--	-	*	0
....CLOSTERIOPSIS	--	-	*	0	--	-	--	-	--	-
....DICTYOSPHAERIUM	1400	4	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	770	2	2000	5	*	0	750	1	710	1
....OOCYSTIS	--	-	*	0	2700	3	1700	3	*	0
....QUADRIGULA	--	-	--	-	--	-	--	-	*	0
....SELENASTRUM	--	-	--	-	*	0	750	1	*	0
....TETRAEDRON	190	1	290	1	--	-	--	-	360	1
....TREUBARIA	--	-	--	-	--	-	--	-	*	0
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	2300	5	3100	3	--	-	*	0
....CRUCIGENIA	--	-	--	-	--	-	750	1	5700	12
....SCENEDESMUS	4400	11	5700	14	14000#	20	40000#	61	11000#	22
....TETRASTRUM	510	1	--	-	--	-	3700	6	3600	7
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	770	1	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	*	0	--	-	--	-	--	-	*	0
....CHLAMYDOMONAS	510	1	1700	4	770	1	*	0	--	-
....CHLOROGONIUM	*	0	--	-	--	-	--	-	--	-
...PHACOTACEAE										
....PHACOTUS	*	0	--	-	--	-	--	-	*	0
....PTEROMONAS	*	0	--	-	--	-	560	1	*	0
...VOLVOCACEAE										
....PANDORINA	--	-	--	-	2300	3	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....ARTHRODESMUS	--	-	--	-	--	-	*	0	--	-
....STAURASTRUM	--	-	--	-	--	-	*	0	--	-
..CHLOROCOCCALES										
...OOCYSTACEAE										
....GLOEOACTINIUM	--	-	--	-	--	-	--	-	1400	3

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
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04104690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE / TIME	MAY 2,77 1530		JUN 6,77 1430		JUL 11,77 1530		AUG 1,77 1430		SEP 12,77 1530	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	6400#	17	12000#	28	13000	14	6400	10	15000#	31
....MELOSIRA	580	2	2900	7	1500	2	370	1	2300	5
....STEPHANODISCUS	--	-	290	1	3500	4	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-
....COCCONEIS	*	0	290	1	*	0	--	-	*	0
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
....OPEPHORA	--	-	--	-	--	-	--	-	*	0
...EUNOTIACEAE										
....EUNOTIA	--	-	--	-	--	-	--	-	*	0
...FRAGILARIACEAE										
....ASTERIONELLA	190	1	--	-	--	-	--	-	--	-
....FRAGILARIA	1000	3	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	860	2	770	1	560	1	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	--	-	--	-	*	0
...NAVICULACEAE										
....ANOMOEONEIS	--	-	--	-	--	-	--	-	--	-
....GYROSIGMA	--	-	--	-	--	-	--	-	--	-
....NAVICULA	320	1	*	0	--	-	*	0	*	0
....PINNULARIA	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	*	0	290	1	--	-	*	0	710	1
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....DINOBRYON	1500	4	--	-	--	-	--	-	--	-
....OCHROMONAS	1500	4	--	-	--	-	--	-	*	0
...SYNURACEAE										
....SYNURA	--	-	--	-	--	-	--	-	--	-
.XANTHOPHYCEAE										
..HETEROCOCCALES										
...CENTRITRACTACEAE										
....CENTRITRACTUS	--	-	--	-	--	-	--	-	*	0
...CHLOROTHECIACEAE										
....OPHIOCYTIUM	--	-	--	-	--	-	*	0	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCOCCALES										
...CHROCOCCACEAE										
....ANACYSTIS	1200	3	9500#	23	9700	11	2400	4	2100	4
..HORMOGONALES										
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	8900	10	--	-	--	-
....OSCILLATORIA	4800	12	--	-	--	-	--	-	--	-
....SPIRULINA	*	0	--	-	--	-	--	-	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	770	2	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	370	1	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	2600	7	--	-	--	-	1500	2	*	0
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	*	0	--	-	--	-	*	0	*	0
....PHACUS	*	0	--	-	--	-	--	-	*	0
....TRACHELOMONAS	2500	7	570	1	770	1	--	-	540	1
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	603	585	593	648	607	634			
2	---	---	---	604	590	598	660	620	641			
3	---	---	---	605	592	599	655	625	645			
4	---	---	---	604	556	580	659	648	656			
5	---	---	---	604	589	600	659	641	651			
6	---	---	---	612	603	606	648	633	641			
7	---	---	---	614	599	612	650	633	642			
8	594	578	584	598	584	591	---	---	---			
9	605	580	595	624	484	592	---	---	---			
10	600	588	594	618	485	578	---	---	---			
11	592	570	588	604	591	596	---	---	---			
12	594	568	589	601	589	595	---	---	---			
13	598	574	589	631	487	588	---	---	---			
14	578	538	572	621	601	609	---	---	---			
15	578	540	572	623	613	616	---	---	---			
16	576	569	571	633	613	619	---	---	---			
17	571	559	567	626	610	621	---	---	---			
18	580	559	566	641	604	623	---	---	---			
19	575	557	567	646	640	643	---	---	---			
20	579	565	575	648	641	644	---	---	---			
21	584	551	575	646	618	634	---	---	---			
22	553	540	547	631	616	626	---	---	---			
23	562	522	553	647	628	640	---	---	---			
24	573	564	568	648	634	639	---	---	---			
25	587	574	578	666	641	651	---	---	---			
26	591	578	584	652	424	487	---	---	---			
27	597	577	584	601	424	478	---	---	---			
28	589	581	586	662	626	642	---	---	---			
29	601	590	596	646	631	639	---	---	---			
30	604	523	586	666	640	653	---	---	---			
31	588	515	555	---	---	---	---	---	---			
MONTH	605	515	577	666	424	606	666	607	644			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1							---	---	---	531	511	520
2							---	---	---	547	490	515
3							---	---	---	550	533	541
4							---	---	---	552	429	520
5							---	---	---	520	337	432
6							---	---	---	557	505	533
7							---	---	---	559	522	548
8							507	495	503	548	495	529
9							513	500	507	548	500	528
10							527	498	512	572	539	557
11							530	521	525	580	492	549
12							532	523	528	582	559	573
13							536	527	532	583	554	571
14							544	532	537	599	560	575
15							544	534	540	600	539	583
16							546	531	540	614	588	597
17							546	528	541	620	442	578
18							566	537	552	616	578	601
19							568	545	563	606	556	587
20							562	213	368	624	595	612
21							372	287	334	636	613	619
22							366	284	334	630	347	546
23							477	355	421	628	601	613
24							501	378	471	634	612	625
25							356	261	317	640	614	624
26							480	346	408	644	569	592
27							497	394	442	633	556	590
28							522	497	508	626	571	600
29							530	505	519	632	606	622
30							530	506	516	636	621	630
31							---	---	---	639	286	453
MONTH							568	213	479	644	286	567

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	465	347	386	---	---	---	534	478	509	431	294	333
2	483	396	439	---	---	---	546	534	539	367	285	313
3	590	490	529	---	---	---	546	517	533	509	370	426
4	637	588	606	---	---	---	539	244	476	522	475	504
5	639	378	481	---	---	---	321	232	265	508	299	346
6	553	457	508	---	---	---	290	247	267	---	---	---
7	556	487	531	---	---	---	338	274	306	---	---	---
8	564	434	531	---	---	---	337	235	282	---	---	---
9	543	466	518	---	---	---	330	212	287	---	---	---
10	589	528	550	---	---	---	301	229	257	---	---	---
11	587	353	408	---	---	---	413	300	361	---	---	---
12	379	355	364	517	278	459	533	408	466	---	---	---
13	426	381	404	519	474	508	541	326	478	367	288	327
14	472	407	434	523	383	476	541	354	471	465	223	329
15	547	459	496	488	460	474	554	520	539	502	295	394
16	576	522	539	497	474	488	555	345	470	368	316	345
17	583	274	523	486	323	420	541	487	515	369	253	314
18	471	282	361	480	313	428	551	376	528	317	228	274
19	487	420	453	479	430	452	558	516	538	357	305	332
20	519	483	505	507	440	459	547	523	534	418	359	393
21	525	501	510	507	446	485	541	354	454	453	395	419
22	---	---	---	540	444	483	533	473	494	447	282	387
23	---	---	---	552	443	507	547	523	535	323	287	304
24	---	---	---	459	251	426	561	541	550	316	200	241
25	---	---	---	521	294	367	566	537	553	384	273	322
26	---	---	---	548	456	481	564	474	536	478	376	423
27	---	---	---	555	522	537	521	418	488	491	478	485
28	---	---	---	554	526	543	511	238	424	521	485	500
29	---	---	---	517	371	496	352	255	288	524	498	512
30	---	---	---	528	456	487	435	344	381	521	488	501
31	---	---	---	498	492	509	464	384	421	---	---	---
MONTH	639	274	480	555	251	474	566	212	443	524	200	379

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	6.5	4.5	5.5	0.0	0.0	0.0	0.0	0.0	0.0
2	---	---	---	8.0	5.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0
3	---	---	---	6.0	5.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0
4	---	---	---	5.0	3.5	4.5	0.0	0.0	0.0	0.0	0.0	0.0
5	---	---	---	4.5	3.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0
6	---	---	---	5.0	3.5	4.0	0.0	0.0	0.0	0.0	0.0	0.0
7	---	---	---	5.0	3.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0
8	12.0	11.0	11.5	3.0	1.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
9	11.5	9.5	11.0	4.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
10	12.0	10.0	11.5	4.0	2.5	3.0	0.0	0.0	0.0	0.0	0.0	0.0
11	12.5	10.0	11.5	3.0	2.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0
12	14.0	10.5	12.5	3.0	1.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0
13	13.5	12.0	13.5	3.5	2.5	3.0	0.0	0.0	0.0	0.0	0.0	0.0
14	12.0	10.0	11.5	3.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0
15	11.5	10.0	11.0	3.0	1.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0
16	10.0	8.0	9.0	3.5	1.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0
17	9.5	7.5	8.5	3.0	1.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0
18	8.5	6.5	7.5	4.5	1.5	3.0	0.0	0.0	0.0	0.0	0.0	0.0
19	7.5	6.0	7.0	4.5	3.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0
20	8.0	5.0	7.0	4.0	2.5	3.0	0.0	0.0	0.0	0.0	0.0	0.0
21	7.5	5.0	6.5	3.0	1.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0
22	5.0	4.5	4.5	1.5	0.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0
23	5.5	3.5	4.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	6.0	5.0	5.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	7.0	5.0	5.5	3.0	0.0	1.5	0.0	0.0	0.0	---	---	---
26	6.0	4.5	5.0	4.0	3.0	4.0	0.0	0.0	0.0	---	---	---
27	5.5	3.0	4.5	3.5	2.5	3.0	0.0	0.0	0.0	---	---	---
28	5.0	3.5	4.5	2.0	0.0	0.5	0.0	0.0	0.0	---	---	---
29	7.0	4.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	---	---	---
30	6.5	5.5	6.0	0.0	0.0	0.0	0.0	0.0	0.0	---	---	---
31	7.5	5.5	6.0	---	---	---	0.0	0.0	0.0	---	---	---
MONTH	14.0	3.0	8.0	8.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1				---	---	---	12.0	5.5	8.5	18.0	13.5	15.5
2				---	---	---	14.0	8.0	11.0	18.0	15.0	16.5
3				---	---	---	12.5	6.5	10.0	18.5	13.0	16.0
4				---	---	---	10.0	6.0	7.5	17.0	13.5	15.5
5				---	---	---	---	---	---	21.5	13.5	17.5
6				---	---	---	---	---	---	21.0	17.5	19.5
7				---	---	---	---	---	---	19.5	16.5	18.0
8				---	---	---	10.0	4.0	7.5	18.0	15.0	16.5
9				6.5	2.5	3.5	13.0	4.0	8.5	17.0	13.5	15.0
10				7.5	2.5	4.0	17.0	7.0	12.0	18.0	13.5	16.0
11				9.0	2.5	5.5	19.0	11.5	15.0	20.0	15.0	17.0
12				13.0	6.5	10.0	19.5	12.5	16.0	20.5	16.0	18.0
13				10.0	7.0	8.0	17.0	13.5	15.0	22.0	16.5	19.0
14				8.5	6.5	7.5	17.0	13.0	15.0	22.0	18.0	20.5
15				12.5	6.0	8.5	18.5	13.0	15.5	24.5	18.5	21.5
16				9.5	4.5	6.5	18.5	14.5	17.0	25.5	19.5	22.5
17				6.0	3.5	5.0	20.0	17.0	18.5	25.0	20.5	23.0
18				4.5	3.0	4.0	22.0	17.5	19.5	25.5	21.5	23.5
19				8.5	3.5	5.5	21.0	18.5	20.0	26.0	22.5	25.0
20				7.0	3.5	5.0	20.0	13.5	17.5	28.0	23.5	25.5
21				5.5	3.5	4.5	18.5	16.0	18.0	28.5	24.0	26.0
22				7.5	3.0	5.0	17.0	13.5	15.5	26.5	21.0	24.5
23				5.5	3.0	4.5	17.5	13.0	15.5	28.0	23.0	25.5
24				6.0	3.0	4.0	16.5	13.0	16.0	29.0	25.0	27.0
25				9.5	2.0	6.0	13.5	11.0	12.5	29.5	25.5	27.0
26				10.5	2.0	7.0	16.0	9.0	12.5	27.5	24.5	26.0
27				11.0	5.0	8.5	18.0	12.0	15.0	27.0	24.5	26.0
28				13.5	10.0	11.0	15.0	12.5	13.5	27.5	24.5	26.0
29				15.0	11.0	12.5	16.5	10.5	13.5	26.5	24.5	25.5
30				16.0	10.0	12.0	17.5	12.5	15.0	25.5	23.0	24.5
31				10.0	7.5	9.0	---	---	---	25.0	17.0	22.0
MONTH				16.0	2.0	7.0	22.0	4.0	14.0	29.5	13.0	21.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	22.5	18.0	19.0	---	---	---	26.0	24.0	25.0	22.5	17.0	19.0
2	19.5	17.0	18.0	---	---	---	25.0	23.5	24.5	20.0	16.5	17.5
3	22.0	17.5	20.0	---	---	---	27.0	22.5	24.5	23.0	19.0	21.0
4	23.5	19.5	21.5	---	---	---	27.0	20.5	24.5	24.0	20.0	22.5
5	22.5	18.5	21.5	---	---	---	23.0	18.5	20.5	23.0	17.0	19.5
6	22.5	19.0	20.5	---	---	---	22.0	18.5	20.0	---	---	---
7	20.0	17.0	18.5	---	---	---	22.5	20.0	21.5	---	---	---
8	20.0	16.0	18.5	---	---	---	22.0	17.5	20.5	---	---	---
9	20.0	15.5	17.5	---	---	---	22.5	16.5	20.5	---	---	---
10	20.0	16.5	18.5	---	---	---	22.0	16.0	19.0	---	---	---
11	18.0	15.0	16.0	---	---	---	22.0	21.0	21.5	---	---	---
12	15.5	14.5	15.0	27.0	22.5	25.0	24.0	19.0	21.5	---	---	---
13	17.0	15.0	16.5	28.0	24.5	26.5	25.0	21.0	22.5	16.5	15.5	16.0
14	20.5	16.5	18.5	28.0	22.5	25.5	25.0	21.0	23.0	18.5	14.5	17.0
15	22.5	18.5	20.5	29.5	25.0	27.0	25.0	21.0	23.5	18.0	14.0	16.0
16	25.0	20.0	23.0	29.0	25.5	28.0	23.0	20.5	22.0	17.0	14.0	16.0
17	26.0	18.0	23.5	29.0	23.0	26.0	24.0	21.5	22.5	17.0	15.5	16.5
18	24.5	17.0	21.0	27.5	23.5	26.0	23.5	20.5	22.5	18.0	14.0	16.5
19	26.0	21.0	23.0	30.0	24.5	27.5	23.0	19.5	21.5	18.0	17.0	17.5
20	24.5	22.0	23.5	31.5	26.5	29.0	22.5	19.0	21.5	17.0	15.0	16.0
21	25.0	21.5	23.5	29.5	27.5	28.5	21.5	18.0	20.0	17.5	15.0	16.0
22	---	---	---	28.5	24.5	26.5	24.0	19.0	21.0	19.0	16.0	17.0
23	---	---	---	29.0	25.0	27.0	22.0	21.0	21.5	17.5	15.5	16.5
24	---	---	---	27.0	21.0	24.0	22.5	19.0	21.0	17.5	14.0	15.5
25	---	---	---	24.0	21.5	22.5	23.0	18.0	20.5	19.0	16.0	17.5
26	---	---	---	24.5	22.5	23.5	22.5	19.0	20.5	20.0	17.0	18.5
27	---	---	---	25.5	21.5	23.5	28.0	21.0	24.0	18.5	17.5	18.0
28	---	---	---	26.0	22.0	24.0	26.5	17.0	23.5	20.0	17.0	18.5
29	---	---	---	24.5	21.5	23.5	21.0	15.0	17.5	18.5	17.0	18.0
30	---	---	---	27.0	22.0	24.0	22.5	19.5	21.0	18.5	17.0	17.5
31	---	---	---	28.0	24.5	26.0	24.0	19.5	21.5	---	---	---
MONTH	26.0	14.5	20.0	31.5	21.0	25.5	28.0	15.0	22.0	24.0	14.0	17.5

NOTE: NUMBER OF MISSING DAYS OF RECORD EXCEEDED 20% OF YEAR

04108800 BLACK RIVER NEAR ZEELAND, MI

LOCATION.--Lat 42°46'40", long 86°01'06", in NW¼ sec.31, T.5 N., R.14 W., Ottawa County, Hydrologic Unit 04050002, on left bank 20 ft (6 m) upstream from bridge on State Road, 0.2 mi (0.3 km) downstream from South Branch, and 2.5 mi (4.0 km) south of Zeeland.

DRAINAGE AREA.--65.8 mi² (170.4 km²).

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 590 ft (180 m) from topographic map.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--17 years, 59.3 ft³/s (1.679 m³/s), 12.24 in/yr (311 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,710 ft³/s (105 m³/s) Dec. 30, 1972, gage height, 13.20 ft (4.023 m); minimum, 0.9 ft³/s (0.025 m³/s) Aug. 24, 1962; minimum gage height, 1.79 ft (0.546 m) Sept. 30, Oct. 3, 1969.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 728 ft³/s (20.6 m³/s) Mar. 29, gage height, 8.63 ft (2.630 m); maximum gage height, 10.67 ft (3.252 m) Mar. 10, backwater from ice; no peak discharge above base of 900 ft³/s (25.5 m³/s); minimum, 1.2 ft³/s (0.034 m³/s) Nov. 16; minimum gage height, 1.90 ft (0.579 m) Aug. 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.4	3.0	3.5	3.8	2.4	26	48	17	9.7	9.8	1.8	3.6
2	2.5	2.5	4.0	3.8	2.4	26	132	16	9.1	5.8	1.7	3.9
3	2.4	2.4	4.5	3.8	2.4	55	124	15	9.1	5.7	1.8	3.4
4	2.3	2.6	4.5	3.8	2.4	140	76	15	8.3	5.7	1.7	3.1
5	2.3	2.5	4.5	3.8	2.4	400	199	18	9.7	5.2	2.3	3.0
6	3.7	2.4	4.5	3.8	2.4	400	89	17	11	4.4	2.4	2.9
7	3.8	2.4	4.5	3.7	2.4	380	63	14	8.8	3.7	2.3	2.7
8	3.2	2.3	4.4	3.5	2.4	390	47	11	9.1	3.6	2.5	2.9
9	3.0	2.3	4.3	3.2	2.4	450	36	9.9	11	3.3	3.4	2.8
10	2.6	2.6	4.3	3.0	2.7	430	31	9.2	8.6	2.9	10	2.7
11	2.4	2.7	4.2	2.9	3.1	380	27	8.6	9.4	2.6	4.4	2.7
12	2.3	2.8	4.1	2.7	3.7	314	24	7.9	9.8	2.4	2.7	2.7
13	2.2	2.9	4.0	2.6	4.3	267	22	7.1	8.0	2.0	2.3	3.6
14	2.2	2.7	3.9	2.6	4.4	147	21	6.7	6.9	2.3	2.5	3.3
15	2.5	2.6	3.8	2.5	4.5	95	19	6.4	5.9	1.9	2.0	3.6
16	2.6	2.4	3.8	2.5	4.5	66	19	6.1	5.2	1.7	2.2	4.5
17	2.6	2.6	3.8	2.5	4.5	46	18	6.4	4.8	1.9	2.1	4.3
18	2.6	2.7	3.8	2.5	4.5	50	17	6.5	9.9	2.6	2.0	5.6
19	2.8	2.6	3.8	2.5	4.5	102	16	6.7	6.3	3.1	1.9	8.8
20	3.0	2.4	3.8	2.5	4.5	220	60	6.5	4.8	2.5	1.9	5.3
21	3.0	2.7	3.8	2.5	4.5	218	53	6.2	4.4	2.5	2.1	4.3
22	3.0	2.4	3.8	2.5	5.2	182	41	8.0	3.7	2.5	2.3	3.9
23	3.0	3.0	3.8	2.5	7.0	118	32	7.5	3.3	2.3	2.2	3.8
24	3.0	3.4	3.8	2.5	9.0	66	25	6.7	3.1	2.4	2.1	16
25	3.0	3.5	3.8	2.5	17	47	43	6.3	3.3	2.9	2.2	31
26	2.9	5.0	3.8	2.5	19	40	56	6.0	3.9	2.3	2.1	15
27	2.8	6.5	3.8	2.5	34	35	31	5.8	3.5	1.9	1.9	8.2
28	2.7	5.0	3.8	2.5	30	112	23	5.9	4.1	1.8	2.4	6.2
29	2.7	3.6	3.8	2.5	---	642	19	5.8	4.4	2.9	14	5.4
30	3.1	3.0	3.8	2.5	---	192	18	5.7	7.3	2.9	9.3	6.0
31	4.3	---	3.8	2.5	---	72	---	7.1	---	2.2	4.1	---
TOTAL	86.9	89.5	123.8	89.5	192.5	6108	1429	282.0	206.4	99.7	98.6	175.2
MEAN	2.80	2.98	3.99	2.89	6.88	197	47.6	9.10	6.88	3.22	3.18	5.84
MAX	4.3	6.5	4.5	3.8	34	642	199	18	11	9.8	14	31
MIN	2.2	2.3	3.5	2.5	2.4	26	16	5.7	3.1	1.7	1.7	2.7
CFSM	.04	.05	.06	.04	.11	2.99	.72	.14	.11	.05	.05	.09
IN.	.05	.05	.07	.05	.11	3.45	.81	.16	.12	.06	.06	.10

CAL YR 1976 TOTAL 24181.0 MEAN 66.1 MAX 1590 MIN 2.0 CFSM 1.01 IN 13.67
WTR YR 1977 TOTAL 8981.1 MEAN 24.6 MAX 642 MIN 1.7 CFSM .37 IN 5.08

04109000 GRAND RIVER AT JACKSON, MI

LOCATION.--Lat 42°17'05", long 84°24'30", in sec.22, T.2 S., R.1 W., Jackson County, Hydrologic Unit 04050004, on left bank of sewage-treatment plant, 1 mi (2 km) north of Jackson, 2.2 mi (3.5 km) upstream from Portage River, and at mile 216 (348 km).

DRAINAGE AREA.--174 mi² (451 km²).

PERIOD OF RECORD.--April 1935 to current year.

REVISED RECORDS.--WSP 974: 1937(M). WSP 1387: 1936. WSP 1727: 1950(M).

GAGE.--Water-stage recorder. Datum of gage is 900.00 ft (274.320 m) above mean sea level (Fargo Engineering Co. bench mark). Prior to Sept. 24, 1935, nonrecording gage at same site and datum.

REMARKS.--Records good. Slight regulation by mills above station. Flow includes about 17 ft³/s (0.48 m³/s) as sewage effluent from the city of Jackson, which originates from ground water sources. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--42 years, 120 ft³/s (3.398 m³/s), 9.37 in/yr (238 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,070 ft³/s (30.3 m³/s) June 25, 1937, gage height, 13.50 ft (4.115 m); maximum gage height, 15.44 ft (4.706 m) June 25, 1968; minimum discharge, 9.2 ft³/s (0.26 m³/s) Aug. 22, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 456 ft³/s (12.9 m³/s) Apr. 2, gage height, 11.17 ft (3.405 m); minimum, 25 ft³/s (0.71 m³/s) Aug. 21, Sept. 11; minimum gage height, 8.22 ft (2.505 m) Aug. 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	55	160	81	41	49	184	351	203	49	61	38	57
2	51	78	74	42	49	185	391	203	47	46	37	52
3	42	63	65	51	54	197	403	194	47	34	37	37
4	51	65	60	55	90	288	392	200	40	72	36	31
5	78	73	55	94	106	255	375	192	115	52	42	31
6	150	119	63	55	106	280	333	182	150	49	34	39
7	150	103	66	54	106	288	300	121	131	48	28	40
8	167	59	65	48	59	286	277	104	121	48	45	39
9	121	59	63	45	58	257	259	105	92	39	38	40
10	64	58	68	53	59	261	247	97	73	35	76	37
11	71	57	58	53	64	296	242	95	82	41	116	28
12	70	57	52	54	66	287	184	147	126	61	55	35
13	66	51	59	54	65	301	155	134	120	47	40	99
14	60	47	60	54	61	313	144	78	68	42	33	110
15	60	56	62	98	60	301	145	68	64	41	42	129
16	49	57	69	113	62	258	181	77	61	49	43	128
17	43	58	122	116	61	240	173	102	88	36	42	99
18	50	116	122	101	61	248	167	106	111	64	40	59
19	53	108	114	50	58	237	113	147	45	56	39	60
20	64	51	110	49	54	230	110	155	52	48	34	55
21	115	47	53	49	63	223	120	67	50	72	39	54
22	102	55	58	46	70	227	195	59	50	55	41	67
23	48	58	55	41	160	217	214	64	49	41	41	116
24	47	56	47	49	182	205	204	62	49	38	43	130
25	53	48	44	51	198	160	242	61	44	47	42	69
26	55	81	43	52	169	202	264	58	35	43	91	109
27	55	158	49	51	163	212	275	57	44	40	40	79
28	54	140	51	49	180	316	278	48	43	39	32	75
29	54	144	49	46	---	347	265	39	59	39	64	127
30	63	145	48	44	---	398	220	39	84	35	45	135
31	72	---	43	46	---	370	---	47	---	31	44	---
TOTAL	2233	2427	2028	1804	2533	8069	7219	3311	2189	1449	1417	2166
MEAN	72.0	80.9	65.4	58.2	90.5	260	241	107	73.0	46.7	45.7	72.2
MAX	167	160	122	116	198	398	403	203	150	72	116	135
MIN	42	47	43	41	49	160	110	39	35	31	28	28
CFSM	.41	.47	.38	.33	.52	1.49	1.39	.62	.42	.27	.26	.42
IN.	.48	.52	.43	.39	.54	1.73	1.54	.71	.47	.31	.30	.46

CAL YR 1976 TOTAL 61435 MEAN 168 MAX 700 MIN 29 CFSM .97 IN 13.13
WTR YR 1977 TOTAL 36845 MEAN 101 MAX 403 MIN 28 CFSM .58 IN 7.88

04111000 GRAND RIVER NEAR EATON RAPIDS, MI

LOCATION.--Lat 42°32'05", long 84°37'25", in NE¼ sec.26, T.2 N., R.3 W., Eaton County, Hydrologic Unit 04050004, on right bank 400 ft (122 m) upstream from bridge on Petrieville Highway, 2 mi (3 km) northeast of Eaton Rapids, 2.5 mi (4.0 km) downstream from Spring Brook, 25 mi (40 km) upstream from Red Cedar River at mile 178 (286 km).

DRAINAGE AREA.--661 mi² (1,712 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1950 to current year. Gage-height record for flood seasons collected in this vicinity 1905-28 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1707: 1951(M).

GAGE.--Water-stage recorder. Datum of gage is 852.68 ft (259.897 m) above mean sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Water-discharge record good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplant at Smithville and mills at Eaton Rapids.

AVERAGE DISCHARGE.--27 years, 458 ft³/s (12.97 m³/s), 9.41 in/yr (239 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,500 ft³/s (99.1 m³/s) Feb. 21, 1971; maximum gage height, 8.19 ft (2.496 m) June 28, 1968; minimum discharge, 14 ft³/s (0.40 m³/s) Dec. 20, 1962, Oct. 14, 1966; minimum gage height, 0.67 ft (0.204 m) Dec. 20, 1962; minimum daily discharge, 21 ft³/s (0.59 m³/s) Oct. 12, 1964.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 4, 1950, reached a stage of 8.15 ft (2.484 m), discharge, 3,860 ft³/s (109 m³/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,550 ft³/s (43.9 m³/s) Apr. 5, gage height, 4.77 ft (1.454 m); minimum, 19 ft³/s (0.54 m³/s) June 25, gage height, 0.75 ft (0.229 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	230	228	260	160	160	600	1380	848	133	192	116	120
2	194	233	250	160	160	560	1310	810	143	159	119	125
3	151	283	240	160	160	520	1330	771	141	172	118	97
4	162	236	230	170	160	790	1340	745	144	162	112	94
5	166	224	230	180	160	1050	1480	714	150	171	111	102
6	176	218	220	200	170	1040	1440	692	238	172	46	121
7	236	209	220	190	180	1040	1370	664	314	157	47	118
8	308	279	220	180	190	960	1280	624	312	166	119	112
9	304	224	215	190	195	930	1180	596	281	105	116	117
10	291	210	210	200	200	945	1080	500	308	71	118	44
11	302	202	200	180	200	975	1010	445	260	158	122	99
12	233	194	200	170	200	980	948	459	203	128	131	105
13	210	183	210	160	200	990	895	373	259	112	162	128
14	206	182	220	160	200	1020	844	340	263	113	129	132
15	197	189	200	160	200	1010	796	314	251	121	149	196
16	190	193	190	170	200	990	744	340	243	92	106	245
17	176	200	180	190	200	971	720	288	178	99	117	274
18	173	175	180	210	200	947	678	262	170	135	110	251
19	148	175	190	220	200	909	620	301	183	146	105	242
20	152	190	220	220	200	889	621	318	240	141	40	191
21	196	235	210	210	200	871	547	301	171	138	62	188
22	186	227	200	190	210	857	550	321	146	145	104	179
23	207	204	190	180	230	855	578	288	168	135	107	174
24	222	170	190	190	350	840	672	258	150	147	111	163
25	215	154	180	180	630	818	722	222	97	124	107	211
26	201	179	180	170	680	807	873	184	141	126	112	290
27	201	284	170	170	680	811	917	183	160	128	43	233
28	182	350	170	170	640	912	953	156	113	125	108	229
29	198	360	170	160	---	1200	915	161	130	127	129	197
30	184	290	170	160	---	1350	884	159	148	79	115	202
31	188	---	170	160	---	1440	---	219	---	104	122	---
TOTAL	6385	6680	6285	5570	7355	28877	28677	12856	5838	4150	3313	4979
MEAN	206	223	203	180	263	932	956	415	195	134	107	166
MAX	308	360	260	220	680	1440	1480	848	314	192	162	290
MIN	148	154	170	160	160	520	547	156	97	71	40	44
CFSM	.31	.34	.31	.27	.40	1.41	1.45	.63	.30	.20	.16	.25
IN.	.36	.38	.35	.31	.41	1.63	1.61	.72	.33	.23	.19	.28

CAL YR 1976 TOTAL 220211 MEAN 602 MAX 2930 MIN 49 CFSM .91 IN 12.39
WTR YR 1977 TOTAL 120965 MEAN 331 MAX 1480 MIN 40 CFSM .50 IN 6.81

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1963 to September 1974, October 1975 to February 1977 (discontinued).

INSTRUMENTATION.--Temperature recorder from October 1963 to February 1977.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 35.0°C Aug. 2, 1964; minimum, 0.0°C on many days during winter periods.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	14.5	13.5	4.5	4.5	1.0	0.5	0.0	0.0	0.0	0.0		
2	15.0	14.0	4.5	4.5	1.0	0.5	0.0	0.0	0.0	0.0		
3	16.0	15.0	4.5	4.5	1.0	0.5	0.0	0.0	0.0	0.0		
4	16.0	15.0	4.0	4.0	0.5	0.5	0.0	0.0	0.0	0.0		
5	16.0	16.0	4.0	4.0	0.5	0.0	0.0	0.0	0.0	0.0		
6	15.5	14.0	4.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0		
7	14.0	12.5	3.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0		
8	12.5	12.0	3.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0		
9	12.0	11.5	3.5	3.5	0.0	0.0	0.0	0.0	---	---		
10	12.0	11.5	3.5	3.5	0.0	0.0	0.0	0.0	---	---		
11	11.0	10.0	3.5	3.5	0.0	0.0	0.0	0.0	---	---		
12	11.0	10.5	3.5	3.0	0.0	0.0	0.0	0.0	---	---		
13	11.0	11.0	3.0	3.0	0.0	0.0	0.0	0.0	---	---		
14	11.0	10.5	2.5	2.5	0.0	0.0	0.0	0.0	---	---		
15	10.5	10.5	2.5	2.5	0.0	0.0	0.0	0.0	---	---		
16	10.5	10.5	2.5	2.5	0.0	0.0	0.0	0.0	---	---		
17	10.5	8.5	2.5	2.0	0.0	0.0	0.0	0.0	---	---		
18	8.5	6.5	2.0	2.0	0.0	0.0	0.0	0.0	---	---		
19	6.5	6.5	2.5	2.0	0.0	0.0	0.0	0.0	---	---		
20	6.5	6.5	2.5	2.5	0.0	0.0	0.0	0.0	---	---		
21	6.5	6.0	2.5	2.5	0.0	0.0	0.0	0.0	---	---		
22	6.0	5.5	2.5	2.5	0.0	0.0	0.0	0.0	---	---		
23	5.5	5.5	2.5	2.0	0.0	0.0	0.0	0.0	---	---		
24	5.5	5.5	1.5	1.0	0.0	0.0	0.0	0.0	---	---		
25	5.0	5.0	1.0	1.0	0.0	0.0	0.0	0.0	---	---		
26	5.0	4.5	1.0	0.5	0.0	0.0	0.0	0.0	---	---		
27	4.5	4.5	2.0	1.0	0.0	0.0	0.0	0.0	---	---		
28	4.5	4.5	2.0	2.0	0.0	0.0	0.0	0.0	---	---		
29	4.5	4.5	2.0	1.5	0.0	0.0	0.0	0.0	---	---		
30	4.5	4.5	1.5	1.0	0.0	0.0	0.0	0.0	---	---		
31	4.5	4.5	---	---	0.0	0.0	0.0	0.0	---	---		
MONTH	16.0	4.5	4.5	0.5	1.0	0.0	0.0	0.0	0.0	0.0		

04111379 RED CEDAR RIVER NEAR WILLIAMSTON, MI

LOCATION.--Lat 42°40'59", long 84°13'09", in NE¼ sec.4, T.3 N., R.2 E., Ingham County, Hydrologic Unit 04050004, on right bank, 20 ft (6 m) upstream from bridge on State Highway 52, 1.5 mi (2.4 km) upstream from Squaw Creek, and 3.5 mi (5.6 km) east of Williamston.

DRAINAGE AREA.--163 mi² (422 km²).

PERIOD OF RECORD.--July 1975 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 870 ft (265 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 990 ft³/s (28.0 m³/s) Mar. 5, 6, 1976, gage height, 7.60 ft (2.316 m); minimum, 10 ft³/s (0.28 m³/s) Sept. 9, 1976; minimum gage height, 2.12 ft (0.646 m) Sept. 10, 1977.

EXTREMES FOR OUTSIDE PERIOD OF RECORD.--Flood of April 1975, reached a gage height of 10.41 ft (3.173 m) Apr. 19, and a discharge of 2,640 ft³/s (74.8 m³/s) Apr. 20.

EXTRMES FOR CURRENT YEAR.--Maximum discharge, 482 ft³/s (13.7 m³/s) Apr. 27, gage height, 5.92 ft (1.804 m); minimum, 13 ft³/s (0.37 m³/s) July 19, Sept. 10; minimum gage height, 2.12 ft (0.646 m) Sept. 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	26	35	24	21	110	361	353	24	30	18	17
2	19	26	33	24	21	100	352	296	26	28	15	19
3	19	25	31	24	21	95	386	231	26	23	16	20
4	18	25	30	24	20	140	375	171	24	21	17	20
5	17	24	29	24	20	250	419	148	24	21	18	20
6	30	23	29	24	20	270	410	136	31	18	18	20
7	40	22	29	24	20	260	392	118	32	19	18	17
8	40	22	29	23	20	240	367	101	27	17	18	17
9	36	22	29	23	21	250	334	88	27	16	17	16
10	32	22	29	22	21	260	291	80	26	17	17	14
11	29	22	28	22	22	250	246	76	25	17	18	16
12	26	22	27	22	24	230	200	70	27	17	19	16
13	25	23	26	21	25	230	164	65	29	17	18	21
14	24	23	25	21	26	230	142	61	26	16	18	24
15	23	23	25	21	26	235	126	55	24	17	17	24
16	23	23	25	21	26	209	114	50	23	16	15	28
17	23	23	25	21	26	177	106	47	22	17	17	27
18	22	23	25	21	26	153	101	52	68	18	16	27
19	22	23	25	21	26	134	96	50	103	44	16	30
20	24	24	26	22	26	128	94	46	78	52	15	31
21	25	24	26	22	26	128	90	43	51	35	16	30
22	28	24	26	22	27	131	93	39	38	25	17	28
23	28	25	26	21	35	142	150	37	31	20	16	27
24	27	25	26	21	70	139	222	37	26	18	17	27
25	27	26	26	21	130	131	308	35	23	18	17	31
26	25	31	26	22	140	133	437	32	22	16	17	34
27	24	45	26	23	130	143	468	31	21	15	15	34
28	25	56	26	23	120	182	476	29	19	15	16	31
29	24	45	26	22	---	332	447	28	20	15	18	29
30	24	40	25	22	---	386	405	26	22	18	17	27
31	25	---	25	22	---	377	---	26	---	20	17	---
TOTAL	795	807	844	690	1136	6175	8172	2657	965	656	524	722
MEAN	25.6	26.9	27.2	22.3	40.6	199	272	85.7	32.2	21.2	16.9	24.1
MAX	40	56	35	24	140	386	476	353	103	52	19	34
MIN	17	22	25	21	20	95	90	26	19	15	15	14
CFSM	.16	.17	.17	.14	.25	1.22	1.67	.53	.20	.13	.10	.15
IN.	.18	.18	.19	.16	.26	1.41	1.87	.61	.22	.15	.12	.16

CAL YR 1976 TOTAL 48581 MEAN 133 MAX 958 MIN 12 CFSM .82 IN 11.09
WTR YR 1977 TOTAL 24143 MEAN 66.1 MAX 476 MIN 14 CFSM .41 IN 5.51

04111500 DEER CREEK NEAR DANSVILLE, MI

LOCATION.--Lat 42°36'30", long 84°19'15", in E½ sec.33, T.3 N., R.1 E., Ingham County, Hydrologic Unit 04050004, on right bank 15 ft (5 m) upstream from bridge on Clark Road, 3.5 mi (5.6 km) north of Dansville, and 7.2 mi (11.6 km) upstream from mouth.

DRAINAGE AREA.--16.3 mi² (42.2 km²).

PERIOD OF RECORD.--May 1954 to current year.

REVISED RECORDS.--WSP 1727: 1954(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 889.08 ft (270.992 m) above mean sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 10.5 ft³/s (0.297 m³/s), 8.75 in/yr (222 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 962 ft³/s (27.2 m³/s) Apr. 19, 1975, gage height, 12.18 ft (3.712 m), from flood mark, rating curve extended above 610 ft³/s (17.3 m³/s); minimum, 0.06 ft³/s (0.002 m³/s) Jan. 10, 1970, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 98 ft³/s (2.78 m³/s) Mar. 4, gage height, 4.26 ft (1.298 m), no peak above base of 100 ft³/s (2.83 m³/s); minimum, 0.08 ft³/s (0.002 m³/s) Aug. 28; minimum gage hieight, 2.61 ft (0.796 m) Aug. 28, Sept. 11, 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.58	1.8	1.3	.95	.58	12	18	12	1.8	1.6	.15	.19
2	.54	1.5	1.2	1.0	.56	9.9	25	11	1.8	.81	.11	.48
3	.52	1.4	1.2	1.0	.56	9.2	38	9.2	1.7	.66	.14	.29
4	.47	1.4	1.1	1.0	.55	51	28	9.0	1.5	.74	.29	.24
5	.46	1.3	1.2	1.0	.55	69	42	8.6	1.8	.67	.57	.28
6	1.5	1.3	1.3	1.0	.55	32	28	7.6	2.3	.54	.35	.34
7	1.8	1.2	1.3	1.0	.58	24	21	6.6	1.9	.44	.50	.23
8	1.2	1.2	1.3	.95	.62	21	18	6.0	1.8	.37	.41	.17
9	.98	1.2	1.2	.90	.64	21	15	3.9	1.8	.32	.34	.17
10	.82	1.2	1.1	.90	.64	19	14	5.5	1.5	.25	.43	.18
11	.75	1.2	1.0	.90	.64	16	12	4.9	1.6	.26	.45	.12
12	.71	1.1	1.0	.90	.65	15	10	4.5	1.9	.34	.44	.12
13	.76	1.1	1.0	.90	.67	16	9.2	4.1	1.8	.29	.33	.58
14	.82	1.1	1.0	.90	.70	13	8.4	3.9	1.7	.22	.24	.79
15	.78	1.1	1.0	.90	.78	12	7.6	3.5	1.5	.27	.19	.73
16	.74	1.1	1.1	.90	.85	9.6	7.1	3.3	1.3	.58	.20	1.4
17	.75	1.0	1.2	.90	.90	7.9	6.7	3.2	1.4	.57	.23	1.4
18	.74	1.0	1.2	.90	1.0	8.1	6.2	3.9	7.6	.71	.14	1.4
19	.79	1.0	1.2	.90	1.1	7.8	6.5	3.3	3.1	1.7	.11	2.0
20	1.0	1.0	1.2	.90	1.2	9.3	6.5	2.9	2.0	.91	.10	1.7
21	1.0	1.0	1.2	.90	1.3	8.7	6.3	2.4	1.6	.46	.17	1.3
22	.98	.93	1.2	.90	2.0	11	7.9	2.1	1.3	.39	.17	1.1
23	.91	.95	1.2	.90	2.0	11	19	2.5	1.0	.31	.18	1.1
24	.94	.91	1.2	.90	30	9.8	18	3.1	1.1	.28	.24	1.3
25	.99	.99	1.2	.85	27	9.5	44	2.4	1.1	.40	.20	1.8
26	.92	1.4	1.2	.80	22	12	53	2.1	.95	.31	.16	2.0
27	1.0	3.3	1.2	.75	17	14	30	2.0	.61	.24	.14	2.1
28	1.0	2.8	1.2	.70	14	36	21	1.8	.54	.16	.10	1.7
29	1.1	2.0	1.2	.65	---	73	17	1.7	.70	.26	.28	1.5
30	1.1	1.4	1.1	.62	---	35	14	1.7	1.1	.34	.22	1.4
31	1.8	---	.95	.60	---	23	---	1.7	---	.25	.16	---
TOTAL	28.45	39.88	35.95	27.27	132.62	625.8	557.9	140.4	51.80	15.65	7.74	28.11
MEAN	.92	1.33	1.16	.88	4.74	20.2	18.6	4.53	1.73	.50	.25	.94
MAX	1.8	3.3	1.3	1.0	30	73	53	12	7.6	1.7	.57	2.1
MIN	.46	.91	.95	.60	.55	7.8	6.3	1.7	.54	.16	.10	.12
CFSM	.06	.08	.07	.05	.29	1.24	1.14	.28	.11	.03	.02	.06
IN.	.06	.09	.08	.06	.30	1.43	1.27	.32	.12	.04	.02	.06

CAL YR 1976 TOTAL 4825.36 MEAN 13.2 MAX 194 MIN .17 CFSM .81 IN 11.01
WTR YR 1977 TOTAL 1691.57 MEAN 4.63 MAX 73 MIN .10 CFSM .28 IN 3.86

04112000 SLOAN CREEK NEAR WILLIAMSTON, MI

LOCATION.--Lat 42°40'33", long 84°21'50", in SE¼ NE¼ sec.1, T.3 N., R.1 W., Ingham County, Hydrologic Unit 04050004, on left bank 30 ft (9 m) downstream from bridge on Meridian Road, 2.1 mi (3.4 km) upstream from mouth, and 4.2 mi (6.8 km) west of Williamston.

DRAINAGE AREA.--9.34 mi² (24.19 km²).

PERIOD OF RECORD.--June 1954 to current year.

GAGE.--Water-stage recorder and concrete control with V-notch sharp-crested weir. Datum of gage is 862.12 ft (262.774 m) above mean sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 5.65 ft³/s (0.160 m³/s), 8.21 in/yr (209 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,290 ft³/s (36.5 m³/s) Apr. 18, 1975, gage height, 9.99 ft (3.045 m), from rating curve extended above 660 ft³/s (18.7 m³/s) on basis of computation of peak flow through culvert and over-road embankment; minimum, 0.01 ft³/s (<0.001 m³/s) Sept. 11, 1954, Jan. 18, 1957, gage height, 1.10 ft (0.335 m), caused by unusual regulation; minimum natural discharge, 0.02 ft³/s (0.001 m³/s) July 27, 1965, gage height, 1.18 ft (0.360 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 73 ft³/s (2.07 m³/s) Apr. 2, gage height, 3.42 ft (1.042 m), no peak above base of 120 ft³/s (3.40 m³/s); minimum, 0.04 ft³/s (0.001 m³/s) Aug. 27, 28; minimum gage height, 1.24 ft (0.378 m) Aug. 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.17	.39	.30	.22	.13	1.9	6.6	4.4	1.1	1.4	.19	.19
2	.16	.32	.29	.23	.13	1.8	24	4.0	1.1	.73	.19	.24
3	.16	.31	.28	.24	.12	1.7	31	3.4	.91	.54	.21	.19
4	.24	.30	.28	.24	.12	19	22	3.2	.78	.51	.20	.16
5	.57	.26	.28	.24	.12	19	44	3.1	.83	.46	.21	.17
6	1.0	.26	.28	.23	.12	6.5	19	2.7	1.1	.39	.21	.16
7	1.0	.27	.28	.23	.12	5.0	11	2.2	.88	.38	.21	.15
8	.83	.26	.27	.21	.13	5.5	7.5	2.0	.77	.35	.19	.15
9	.68	.26	.26	.20	.13	11	6.0	1.8	.75	.31	.17	.14
10	.28	.28	.25	.20	.13	8.8	5.2	1.6	.65	.27	.20	.12
11	.26	.28	.24	.20	.14	8.6	4.5	1.5	.65	.28	.18	.12
12	.25	.26	.23	.20	.14	8.6	3.9	1.4	.76	.31	.20	.11
13	.25	.23	.22	.20	.15	6.3	3.5	1.3	.75	.29	.16	.31
14	.32	.24	.21	.20	.16	4.6	3.1	1.2	.63	.26	.15	.23
15	.23	.24	.24	.20	.17	3.9	2.7	1.1	.54	.26	.14	.22
16	.25	.23	.26	.20	.18	3.3	2.5	1.0	.49	.35	.15	.39
17	.23	.22	.27	.20	.19	2.6	2.4	1.0	.45	.32	.16	.34
18	.23	.24	.26	.20	.21	2.5	2.4	1.3	18	.29	.12	.27
19	.26	.25	.26	.20	.23	2.3	2.3	1.1	6.3	.39	.11	.28
20	.30	.25	.26	.20	.26	3.0	2.3	.95	3.2	.30	.11	.43
21	.32	.26	.26	.20	.30	3.0	2.2	.86	2.0	.23	.13	.41
22	.32	.23	.25	.20	.35	4.1	2.2	.79	1.3	.28	.15	.39
23	.30	.23	.25	.20	.60	4.1	5.7	11	1.0	.26	.09	.38
24	30	.22	.25	.20	9.1	3.4	5.9	22	.87	.26	.09	.43
25	.31	.24	.25	.19	7.9	3.4	36	6.4	.77	.23	.08	.53
26	.29	.39	.25	.19	3.6	4.8	37	3.8	.63	.18	.07	.69
27	.27	.72	.25	.17	2.8	6.2	18	2.7	.51	.16	.05	.58
28	.25	.66	.25	.16	2.3	26	9.8	2.0	.47	.14	.07	.46
29	.26	.45	.24	.15	---	42	6.7	1.5	.60	.23	.19	.43
30	.28	.33	.22	.14	---	17	5.3	1.2	.92	.29	.17	.42
31	.46	---	.20	.13	---	9.5	---	1.1	---	.26	.17	---
TOTAL	11.03	9.10	7.89	6.17	30.03	249.4	334.7	93.60	49.71	10.91	4.72	9.09
MEAN	.36	.30	.25	.20	1.07	8.05	11.2	3.02	1.66	.35	.15	.30
MAX	1.0	.72	.30	.24	9.1	42	44	22	18	1.4	.21	.69
MIN	.16	.22	.20	.13	.12	1.7	2.2	.79	.45	.14	.05	.11
CFSM	.04	.03	.03	.02	.12	.86	1.20	.32	.18	.04	.02	.03
IN.	.04	.04	.03	.02	.12	.99	1.33	.37	.20	.04	.02	.04

CAL YR 1976 TOTAL 2541.19 MEAN 6.94 MAX 139 MIN .07 CFSM .74 IN 10.12
WTR YR 1977 TOTAL 816.35 MEAN 2.24 MAX 44 MIN .05 CFSM .24 IN 3.25

04112500 RED CEDAR RIVER AT EAST LANSING, MI

LOCATION.--Lat 42°43'40", long 84°28'40", in SW¼ sec.18, T.4 N., R.1 W., Ingham County, Hydrologic Unit 04050004, in left downstream bridge abutment of Farm Lane Bridge on Michigan State University Campus in East Lansing, 4.0 mi (6.4 km) upstream from Sycamore Creek, and 5.6 mi (9.0 km) upstream from mouth.

DRAINAGE AREA.--355 mi² (919 km²).

PERIOD OF RECORD.--August 1902 to December 1903, March 1931 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as Red Cedar River at Agricultural College, August 1902 to December 1903 and as Cedar River at East Lansing, March 1931 to September 1965. Gage height records collected in this vicinity 1911-19, and for flood seasons only 1920-28, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1307: 1936(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 824.39 ft (251.274 m) above mean sea level. August 1902 to December 1903 nonrecording gage at site 0.8 mi (1.3 km) downstream at different datum. March 1931 to November 1940 water-stage recorder at site 250 ft (76 m) upstream at present datum.

REMARKS.--Records good. Occasional regulation at low flow by mill at Williamston, 16 mi (26 km) above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--47 years, 207 ft³/s (5.862 m³/s), 7.92 in/yr (201 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,940 ft³/s (168 m³/s) Apr. 20, 1975, gage height, 11.95 ft (3.642 m); minimum, 3 ft³/s (0.08 m³/s) July 31, 1931.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Mar. 24, 1904, reached a stage of 13.4 ft (4.08 m), discharge, 8,000 ft³/s (277 m³/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 785 ft³/s (22.2 m³/s) Apr. 27, gage height, 5.11 ft (1.558 m); minimum, 18 ft³/s (0.51 m³/s) Aug. 28, Sept. 12, gage height, 3.10 ft (0.945 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	38	47	67	41	34	191	535	444	53	74	29	34
2	36	49	67	40	34	174	495	387	51	62	28	28
3	34	47	57	40	32	163	635	335	51	51	26	28
4	34	47	51	40	32	261	685	283	51	44	24	26
5	32	44	49	40	32	462	720	250	53	42	28	26
6	62	42	49	40	36	495	765	236	74	38	31	26
7	60	40	49	40	44	462	670	219	69	36	31	26
8	65	38	49	40	44	440	535	205	62	32	29	24
9	60	40	49	40	40	444	444	191	57	31	32	23
10	53	40	49	38	36	466	391	177	55	28	36	21
11	51	42	49	36	40	411	339	166	51	23	29	20
12	44	42	47	36	44	383	295	160	55	20	29	18
13	42	42	44	36	47	383	254	146	57	23	29	47
14	38	42	42	36	47	367	226	120	55	23	29	51
15	38	42	42	36	49	335	205	102	53	23	26	53
16	38	42	42	38	51	303	184	89	51	32	26	57
17	38	40	44	40	53	264	174	84	49	28	23	55
18	38	42	44	40	49	247	166	84	129	29	23	53
19	44	44	44	39	47	226	160	84	205	32	21	67
20	53	44	51	38	47	219	156	79	149	82	20	60
21	55	47	49	37	47	216	156	72	117	77	20	57
22	55	47	49	36	47	219	166	67	84	53	20	55
23	55	47	51	37	55	230	230	62	67	38	21	53
24	55	44	49	38	114	230	315	84	57	34	23	62
25	55	44	47	38	250	219	444	74	53	31	21	65
26	50	53	47	40	261	222	715	65	47	29	21	79
27	44	79	47	40	240	250	780	60	44	26	20	72
28	42	87	44	43	216	339	735	57	53	24	20	62
29	42	82	44	40	---	620	620	55	77	36	29	57
30	44	49	44	40	---	700	520	53	65	31	23	49
31	42	---	43	38	---	650	---	55	---	29	23	---
TOTAL	1437	1435	1499	1201	2068	10591	12715	4545	2094	1161	790	1354
MEAN	46.4	47.8	48.4	38.7	73.9	342	424	147	69.8	37.5	25.5	45.1
MAX	65	87	67	43	261	700	780	444	205	82	36	79
MIN	32	38	42	36	32	163	156	53	44	20	20	18
CFSM	.13	.14	.14	.11	.21	.96	1.19	.41	.20	.11	.07	.13
IN.	.15	.15	.16	.13	.22	1.11	1.33	.48	.22	.12	.08	.14

CAL YR 1976 TOTAL 98983 MEAN 270 MAX 2230 MIN 21 CFSM .76 IN 10.37
WTR YR 1977 TOTAL 40890 MEAN 112 MAX 780 MIN 18 CFSM .32 IN 4.28

04112850 SYCAMORE CREEK NEAR HOLT, MI

LOCATION.--Lat 42°38'25", long 84°28'58", in SW¼ SW¼ sec.18, T.3 N., R.1 W., Ingham County, Hydrologic Unit 04050004, on left bank 15 ft (5 m) downstream from bridge on Holt Road, and 1.5 mi (2.4 km) east of Holt.

DRAINAGE AREA.--80.6 mi² (208.8 km²).

PERIOD OF RECORD.--April 1975 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (259 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Mar. 27 to Apr. 17, which are poor. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,110 ft³/s (59.8 m³/s) Apr. 19, 1975, gage height, 10.00 ft (3.048 m); minimum, 5.2 ft³/s (0.15 m³/s) Aug. 28, 29, Sept. 12, 1977; minimum gage height, 1.63 ft (0.497 m) Sept. 12, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 380 ft³/s (10.8 m³/s) Mar. 29, from correlation with nearby stations; minimum, 5.2 ft³/s (0.15 m³/s) Aug. 28, 29, Sept. 12; minimum gage height, 1.63 ft (0.497 m) Sept. 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.0	16	14	9.5	9.5	42	100	54	15	24	5.8	6.8
2	7.0	14	12	10	8.5	36	140	52	16	14	5.7	9.5
3	7.0	14	12	10	8.0	32	210	46	15	12	5.8	8.0
4	9.0	13	12	10	8.0	89	150	42	14	11	8.3	7.0
5	13	12	12	11	8.0	194	230	43	15	11	6.4	7.0
6	22	11	12	11	8.0	173	140	39	24	11	6.5	6.5
7	20	11	11	11	8.0	113	110	33	23	9.5	7.3	6.5
8	17	10	11	10	8.0	87	90	30	18	9.0	7.7	6.5
9	15	11	11	10	8.0	93	80	28	18	8.6	8.2	6.3
10	10	11	10	10	8.0	114	70	28	16	8.2	8.8	5.5
11	9.0	11	10	10	8.0	101	60	26	15	7.4	8.9	5.4
12	9.0	9.7	9.5	10	8.0	86	55	25	16	7.8	8.2	5.7
13	9.0	9.7	9.5	10	8.5	89	50	23	16	8.0	7.4	12
14	9.0	9.5	9.5	10	9.0	80	45	23	15	7.2	6.4	16
15	8.3	9.1	10	10	9.5	68	40	21	14	6.8	5.8	10
16	8.2	9.2	11	10	10	57	39	19	14	8.3	5.9	20
17	8.3	9.4	11	10	11	48	37	19	16	8.8	7.0	13
18	8.3	9.5	11	10	12	46	36	32	54	8.6	5.9	12
19	8.3	9.7	11	10	13	46	35	24	39	12	5.8	15
20	10	9.4	11	10	14	49	35	21	23	8.8	5.7	13
21	10	9.4	11	10	16	50	35	19	18	7.0	6.0	11
22	11	9.2	11	10	18	54	40	17	15	6.5	6.7	9.8
23	12	9.5	11	10	22	58	74	17	14	6.1	6.4	10
24	11	14	11	10	79	53	86	24	13	5.8	7.0	11
25	11	15	11	10	117	52	106	21	12	5.9	6.3	14
26	11	18	11	10	82	56	200	19	11	5.9	5.8	15
27	11	32	11	10	59	80	188	18	11	5.5	5.7	13
28	11	31	11	10	48	130	123	16	10	5.3	5.3	11
29	11	18	11	10	---	260	83	15	13	5.8	9.8	10
30	11	16	10	10	---	180	65	14	13	9.2	8.5	10
31	19	---	9.0	10	---	130	---	14	---	6.5	7.3	---
TOTAL	343.4	391.3	338.5	312.5	626.0	2746	2752	822	526	271.5	212.3	306.5
MEAN	11.1	13.0	10.9	10.1	22.4	88.6	91.7	26.5	17.5	8.76	6.85	10.2
MAX	22	32	14	11	117	260	230	54	54	24	9.8	20
MIN	7.0	9.1	9.0	9.5	8.0	32	35	14	10	5.3	5.3	5.4
CFSM	.14	.16	.14	.13	.28	1.10	1.14	.33	.22	.11	.09	.13
IN.	.16	.18	.16	.14	.29	1.27	1.27	.38	.24	.13	.10	.14

CAL YR 1976 TOTAL 24006.1 MEAN 65.6 MAX 556 MIN 6.1 CFSM .81 IN 11.08
WTR YR 1977 TOTAL 9648.0 MEAN 26.4 MAX 260 MIN 5.3 CFSM .33 IN 4.45

04113000 GRAND RIVER AT LANSING, MI

LOCATION.--Lat 42°45'02", long 84°33'19", in NW¼ sec.9, T.4 N., R.2 W., Ingham County, Hydrologic Unit 04050004, on right bank 30 ft (9 m) upstream from bridge on North Grand River Avenue in Lansing, 2.0 mi (3.2 km) downstream from Red Cedar River, and at mile 152 (245 km).

DRAINAGE AREA.--1,230 mi² (3,180 km²), approximately.

PERIOD OF RECORD.--March 1901 to September 1906, October 1934 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "at North Lansing" 1901-6. Gage-height records collected in this vicinity 1907-10 (flood seasons only), 1911-19, 1920-28 (flood seasons only), and since 1931 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1174: 1949. WSP 1387: 1901, 1903-4, 1935, 1937, 1942.

GAGE.--Water-stage recorder. Datum of gage is 805.53 ft (245.526 m) above mean sea level (levels by Michigan Department of Natural Resources). Prior to August 1906, nonrecording gage at same site at different datum. November 1934 to June 1949 water-stage recorder at site 1.8 mi (2.9 km) downstream at datum 2.42 ft (0.738 m) lower.

REMARKS.--Records good. Large diurnal fluctuation at medium and low flows caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--48 years, 830 ft³/s (23.51 m³/s), 9.16 in/yr (233 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 24,500 ft³/s (694 m³/s) Mar. 26, 1904, gage height, 18.60 ft (5.669 m), datum then in use, from rating curve extended above 15,000 ft³/s (425 m³/s); minimum, 2.8 ft³/s (0.079 m³/s) Sept. 9, 1963, gage height, 0.85 ft (0.259 m); minimum daily, 20 ft³/s (0.57 m³/s) Aug. 25, 1941.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1901, that of Mar. 26, 1904.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,760 ft³/s (78.2 m³/s) Apr. 6, gage height, 6.94 ft (2.115 m); minimum, 7.4 ft³/s (0.210 m³/s) Jan. 13, gage height, 1.01 ft (0.308 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	244	323	344	211	171	890	2160	1440	304	354	177	348
2	316	324	373	270	187	795	2130	1270	153	309	171	179
3	217	324	342	266	260	764	2280	1240	195	236	175	122
4	206	420	347	240	198	1140	2330	1110	274	275	174	183
5	237	340	335	236	235	1610	2520	1060	194	298	183	113
6	456	255	332	270	187	1580	2690	984	473	252	166	178
7	333	319	332	207	278	1610	2370	926	352	263	118	170
8	339	250	296	272	219	1560	2060	890	376	225	117	117
9	434	400	242	260	291	1700	1860	813	467	152	197	202
10	420	259	353	239	273	1690	1620	784	363	162	212	113
11	343	307	299	314	278	1590	1530	640	412	106	133	88
12	426	245	236	327	309	1600	1340	646	312	106	232	73
13	234	333	273	200	300	1550	1260	573	270	145	156	435
14	314	235	297	227	273	1500	1220	468	417	159	276	151
15	264	251	238	219	381	1470	1130	464	335	161	158	282
16	255	278	284	198	332	1410	1020	505	298	221	167	408
17	258	277	233	223	247	1270	971	416	279	186	125	408
18	220	252	294	223	309	1310	948	460	792	224	213	340
19	226	241	235	304	300	1280	855	351	482	237	111	458
20	229	244	368	247	264	1200	774	451	409	271	168	292
21	261	322	322	286	296	1180	873	440	406	266	152	272
22	313	303	365	286	260	1100	804	429	238	174	89	235
23	242	301	329	201	368	1180	984	404	226	248	86	325
24	266	228	261	235	530	1160	1080	445	334	259	199	357
25	347	261	249	239	926	1090	1680	331	202	185	92	373
26	323	269	337	239	980	1090	1890	324	203	234	193	424
27	282	425	280	251	975	1160	1970	286	180	122	127	395
28	246	445	270	219	926	1450	1880	238	394	253	102	357
29	259	491	247	247	---	1970	1740	264	323	278	243	321
30	308	401	242	208	---	2300	1560	212	442	194	190	206
31	394	---	278	227	---	2340	---	307	---	206	101	---
TOTAL	9212	9323	9233	7591	10553	43539	47529	19171	10105	6761	5003	7925
MEAN	297	311	298	245	377	1404	1584	618	337	218	161	264
MAX	456	491	373	327	980	2340	2690	1440	792	354	276	458
MIN	206	228	233	198	171	764	774	212	153	106	86	73
CFSM	.24	.25	.24	.20	.31	1.14	1.29	.50	.27	.18	.13	.22
IN.	.28	.28	.28	.23	.32	1.32	1.44	.58	.31	.20	.15	.24

CAL YR 1976 TOTAL 388476 MEAN 1061 MAX 6760 MIN 77 CFSM .86 IN 11.75
WTR YR 1977 TOTAL 185945 MEAN 509 MAX 2690 MIN 73 CFSM .41 IN 5.62

04113097 CARRIER CREEK NEAR LANSING, MI

LOCATION.--Lat 42°45'20", long 84°39'10", in SE¼ SW¼ sec.3, T.4 N., R.3 W., Eaton County, Hydrologic Unit 04050004, on left bank 15 ft (5 m) downstream from bridge on Willow Highway, 0.4 mi (0.6 km) upstream from mouth, and 2.6 mi (4.2 km) west of Lansing.

DRAINAGE AREA.--12.1 mi² (31.3 km²).

PERIOD OF RECORD.--January 1975 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 805 ft (245 m) from topographic map (nearest 5 ft).

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 532 ft³/s (15.1 m³/s) Apr. 19, 1975, gage height, 6.76 ft (2.060 m); no flow on many days during June, July, August, and September 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 68 ft³/s (1.93 m³/s) Mar. 4, gage height, 2.71 ft (0.826 m), no peak above base of 80 ft³/s (2.27 m³/s); no flow on many days during June, July, August, and September.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.28	.49	.47	.21	.11	4.0	6.6	3.6	.79	2.1	.00	3.1
2	.28	.37	.44	.20	.10	3.6	15	3.2	.40	.24	.00	1.6
3	.28	.36	.42	.20	.10	3.1	13	2.7	.27	.32	.00	.22
4	.28	.34	.41	.19	.10	38	11	2.6	.18	.45	.08	.03
5	.28	.35	.40	.19	.10	28	13	2.5	1.1	.10	.31	.00
6	10	.39	.39	.18	.09	10	8.6	2.1	1.5	.04	.15	.00
7	1.4	.31	.38	.18	.09	8.0	6.4	1.7	.31	1.4	.01	.00
8	.53	.29	.37	.18	.09	8.6	5.0	1.4	.22	.12	.17	.00
9	.73	.31	.36	.17	.09	11	4.4	1.3	.75	.06	.19	.00
10	.41	.32	.35	.17	.10	9.2	3.9	1.3	.22	.00	.82	.00
11	.34	.30	.34	.16	.16	7.4	3.2	1.2	.39	.00	.09	.00
12	.34	.28	.33	.16	.25	9.5	2.8	1.1	1.1	.00	.12	.00
13	.37	.29	.33	.16	.50	8.6	2.6	1.0	.38	.00	.00	6.3
14	.34	.29	.32	.15	.34	6.6	2.2	.92	.21	.00	.00	2.3
15	.34	.27	.31	.15	.20	5.5	2.0	.80	.18	.00	.00	2.7
16	.34	.28	.30	.15	.14	4.5	1.9	.74	.14	1.9	.00	3.6
17	.34	.26	.30	.14	.12	3.6	1.8	.68	.20	.21	.00	1.0
18	.37	.25	.30	.14	.11	4.5	1.6	.63	5.7	1.4	.00	1.3
19	.37	.28	.44	.14	.11	5.4	1.6	.64	.50	.71	.00	2.0
20	.63	.31	.70	.14	.10	6.3	2.1	.59	.17	.07	.00	1.0
21	.79	.31	.55	.13	.10	5.0	1.7	.60	.12	.00	.00	.56
22	.41	.30	.39	.13	.10	5.5	4.8	.61	.09	.00	.00	.38
23	.33	.28	.30	.13	1.0	5.5	7.0	.64	.06	.00	.01	1.1
24	.34	.28	.27	.12	11	4.8	3.3	.45	.02	.04	.56	4.7
25	.35	.29	.25	.12	9.0	4.8	29	.38	.04	.54	.04	3.7
26	.34	2.0	.24	.12	7.0	5.9	19	.26	.00	.00	.00	2.1
27	.31	5.1	.24	.12	6.0	6.3	11	.23	.00	.00	.00	1.1
28	.31	1.1	.23	.11	5.0	16	7.4	.21	.83	.00	.06	.56
29	.31	.60	.22	.11	---	24	5.5	.17	4.1	3.0	3.2	.44
30	1.2	.50	.22	.11	---	12	4.4	.18	4.4	.96	.32	.32
31	2.3	---	.21	.11	---	8.4	---	2.7	---	.07	.07	---
TOTAL	25.24	17.10	10.78	4.67	42.20	283.6	201.8	37.13	24.37	13.73	6.20	40.11
MEAN	.81	.57	.35	.15	1.51	9.15	6.73	1.20	.81	.44	.20	1.34
MAX	10	5.1	.70	.21	11	38	29	3.6	5.7	3.0	3.2	6.3
MIN	.28	.25	.21	.11	.09	3.1	1.6	.17	.00	.00	.00	.00
CFSM	.07	.05	.03	.01	.13	.76	.56	.10	.07	.04	.02	.11
IN.	.08	.05	.03	.01	.13	.87	.62	.11	.07	.04	.02	.12

CAL YR 1976 TOTAL 3055.42 MEAN 8.35 MAX 116 MIN .15 CFSM .69 IN 9.39
WTR YR 1977 TOTAL 706.93 MEAN 1.94 MAX 38 MIN .00 CFSM .16 IN 2.17

04114000 GRAND RIVER AT PORTLAND, MI

LOCATION.--Lat 42°51'20", long 84°54'45", in NW¼ sec.4, T.5 N., R.5 W., Ionia County, Hydrologic Unit 04050004, on left bank at downstream side of bridge on Kent Street, 1.0 mi (1.6 km) south of Portland, 1.9 mi (3.1 km) upstream from Looking Glass River, and at mile 115 (185 km).

DRAINAGE AREA.--1,385 mi² (3,587 km²).

PERIOD OF RECORD.--August 1952 to current year. Gage-height records for flood seasons collected in this vicinity 1907-28 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 705.00 ft (214.884 m) above mean sea level (levels by Michigan Department of Natural Resources). Prior to July 6, 1953, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for periods of no gage-height record, May 26 to June 23, July 6-13, which are fair. Slight diurnal fluctuation caused by powerplants above station. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--25 years, 912 ft³/s (25.83 m³/s), 8.94 in/yr (227 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,400 ft³/s (351 m³/s) Apr. 21, 1975, gage height, 12.98 ft (3.956 m); minimum, 38 ft³/s (1.08 m³/s) Oct. 10, 1963; minimum daily, 58 ft³/s (1.64 m³/s) Oct. 9, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,980 ft³/s (84.4 m³/s) Apr. 7, gage height, 7.96 ft (2.426 m); minimum daily, 110 ft³/s (3.12 m³/s) July 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	378	452	390	320	290	953	2520	1630	320	506	163	206
2	308	384	400	320	290	930	2430	1500	270	420	221	384
3	369	384	420	320	290	844	2660	1320	170	332	201	240
4	288	381	400	320	290	1120	2640	1270	230	309	210	216
5	259	477	400	320	290	1910	2690	1150	280	303	229	207
6	405	409	400	320	290	1970	2880	1080	300	321	236	167
7	606	339	400	320	290	1840	2790	1010	500	270	214	184
8	410	381	400	320	290	1820	2420	931	380	250	166	211
9	400	332	400	320	290	1860	2150	875	450	200	165	222
10	475	466	400	320	300	2090	1900	810	480	160	296	221
11	460	343	390	320	320	1900	1720	762	400	130	188	163
12	396	376	380	320	340	1840	1550	630	420	110	206	194
13	470	325	370	320	350	1880	1420	636	300	120	230	136
14	332	400	360	310	350	1750	1300	585	300	207	201	517
15	410	309	350	300	360	1680	1210	465	430	202	277	272
16	336	322	350	300	360	1600	1140	455	340	208	235	371
17	304	354	340	300	360	1450	1050	507	300	265	166	482
18	324	352	340	300	360	1440	1010	441	400	233	206	463
19	280	333	350	300	360	1380	977	468	800	257	211	429
20	296	315	360	300	360	1370	897	382	500	278	171	543
21	210	319	370	300	360	1290	854	462	430	280	164	370
22	330	383	370	300	380	1220	882	447	330	298	218	335
23	370	379	370	300	400	1270	980	443	300	224	144	330
24	310	372	360	290	500	1200	1010	441	284	245	124	410
25	318	321	350	290	800	1220	1260	458	361	256	211	521
26	402	332	340	290	1000	1160	2160	360	273	271	161	480
27	377	412	330	290	1050	1190	2220	330	244	213	168	515
28	340	538	330	290	1100	1320	2200	280	232	189	225	475
29	305	450	330	290	---	2060	2010	250	439	239	260	436
30	323	390	320	290	---	2460	1810	270	410	289	309	402
31	411	---	320	290	---	2610	---	230	---	271	235	---
TOTAL	11202	11330	11390	9490	12020	48627	52740	20878	10873	7856	6411	10102
MEAN	361	378	367	306	429	1569	1758	673	362	253	207	337
MAX	606	538	420	320	1100	2610	2880	1630	800	506	309	543
MIN	210	309	320	290	290	844	854	230	170	110	124	136
CFSM	.26	.27	.27	.22	.31	1.13	1.27	.49	.26	.18	.15	.24
IN.	.30	.30	.31	.25	.32	1.31	1.42	.56	.29	.21	.17	.27

CAL YR 1976 TOTAL 449939 MEAN 1229 MAX 7750 MIN 118 CFSM .89 IN 12.09
WTR YR 1977 TOTAL 212919 MEAN 583 MAX 2880 MIN 110 CFSM .42 IN 5.72

04114500 LOOKING GLASS RIVER NEAR EAGLE, MI

LOCATION.--Lat 42°49'45", long 84°46'40", in sec.10, T.5 N., R.4 W., Clinton County, Hydrologic Unit 04050004, on right bank at upstream side of highway bridge, 1.5 mi (2.4 km) northeast of Eagle and 10 mi (16 km) upstream from mouth.

DRAINAGE AREA.--281 mi² (728 km²).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1387: 1946-47.

GAGE.--Water-stage recorder. Datum of gage is 747.09 ft (227.713 m) above mean sea level (levels by Michigan Department of Natural Resources). Prior to June 2, 1962, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Small intermittent diversion at times into Lake Geneva when discharge is above 50 ft³/s (1.42 m³/s). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--33 years, 174 ft³/s (4.928 m³/s), 8.41 in/yr (214 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,860 ft³/s (81.0 m³/s) Apr. 5, 1947, gage height, 7.70 ft (2.347 m), from graph based on gage readings, from rating curve extended above 1,900 ft³/s (53.8 m³/s); maximum gage height, 9.9 ft (3.02 m) Mar. 7, 1956, backwater from ice, from high-water mark; minimum discharge, 10 ft³/s (0.28 m³/s) July 28, 1965, gage height, 1.01 ft (0.308 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 430 ft³/s (12.2 m³/s) Apr. 3, gage height, 3.43 ft (1.045 m); maximum gage height, 4.37 ft (1.332 m) Mar. 5, backwater from ice; minimum discharge, 20 ft³/s (0.57 m³/s) Aug. 28, gage height, 1.20 ft (0.366 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	46	59	70	49	42	150	246	285	45	49	25	31
2	44	60	72	49	42	140	297	295	43	47	25	32
3	41	59	65	49	42	135	377	297	42	45	25	29
4	40	59	58	49	42	200	328	289	41	45	26	27
5	42	60	55	49	42	350	330	277	42	42	29	27
6	78	61	54	48	42	310	324	255	67	38	29	26
7	67	60	53	47	42	326	315	227	48	59	28	25
8	57	59	53	46	42	199	307	201	47	40	28	23
9	56	58	53	46	42	234	306	171	45	36	29	23
10	56	57	53	45	43	267	308	148	43	33	38	23
11	55	55	52	45	45	281	308	127	43	32	31	22
12	52	55	52	44	47	294	303	111	44	32	29	22
13	49	53	50	43	49	304	296	98	44	30	28	28
14	47	53	49	43	50	299	284	91	43	28	27	34
15	45	51	49	43	51	293	270	85	42	28	26	33
16	43	51	48	42	52	286	251	78	40	28	25	42
17	43	50	48	42	52	276	230	73	38	28	25	38
18	43	50	48	42	52	279	209	69	43	29	24	39
19	43	51	48	42	52	273	186	65	38	30	23	41
20	43	51	48	42	52	269	168	62	39	28	22	44
21	46	51	48	42	52	254	156	59	37	26	22	46
22	46	51	48	42	54	241	145	56	36	26	23	48
23	46	51	48	42	80	230	148	53	34	25	23	50
24	48	51	48	42	120	213	152	51	33	24	22	56
25	49	51	48	42	190	202	219	49	32	25	22	69
26	50	55	48	42	210	199	274	47	31	24	21	53
27	49	72	48	42	200	197	265	45	30	23	21	48
28	48	70	49	42	180	230	253	43	30	23	21	44
29	48	58	49	42	---	326	259	41	48	24	31	43
30	50	58	49	42	---	277	272	40	46	27	28	45
31	59	---	49	42	---	251	---	43	---	26	25	---
TOTAL	1529	1680	1610	1367	2009	7785	7786	3831	1234	1000	801	1111
MEAN	49.3	56.0	51.9	44.1	71.8	251	260	124	41.1	32.3	25.8	37.0
MAX	78	72	72	49	210	350	377	297	67	59	38	69
MIN	40	50	48	42	42	135	145	40	30	23	21	22
CFSM	.18	.20	.19	.16	.26	.89	.93	.44	.15	.12	.09	.13
IN.	.20	.22	.21	.18	.27	1.03	1.03	.51	.16	.13	.11	.15

CAL YR 1976 TOTAL 98555 MEAN 269 MAX 2010 MIN 35 CFSM .96 IN 13.05
WTR YR 1977 TOTAL 31743 MEAN 87.0 MAX 377 MIN 21 CFSM .31 IN 4.20

04115000 MAPLE RIVER AT MAPLE RAPIDS, MI

LOCATION.--Lat 43°06'35", long 84°41'35", in sec.5, T.8 N., R.3 W., Clinton County, Hydrologic Unit 04050005, on right bank at downstream side of bridge on Maple Road at Maple Rapids, 50 ft (15 m) upstream from Pine Creek, and 0.8 mi (1.3 km) upstream from Hayworth Creek. Records include flow of Pine Creek.

DRAINAGE AREA.--434 mi² (1,124 km²).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1707: 1956.

GAGE.--Water-stage recorder. Datum of gage is 642.58 ft (195.858 m) above mean sea level (levels by Michigan Department of Natural Resources). Prior to Oct. 4, 1968, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, and those for July and August, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--33 years, 252 ft³/s (7.137 m³/s), 7.89 in/yr (200 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 6,500 ft³/s (184 m³/s) Mar. 20, 1948; maximum gage height, 11.22 ft (3.420 m) Mar. 20, 1948, from floodmark, backwater from ice ; minimum discharge, 4.4 ft³/s (0.12 m³/s) Aug. 13, 1965, gage height, 1.62 ft (0.494 m).

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in March 1904 reached a stage of 13.8 ft (4.21 m), from information by local resident.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 509 ft³/s (14.4 m³/s) Mar. 12, gage height, 6.33 ft (1.929 m); minimum, 4.6 ft³/s (0.13 m³/s) July 28; minimum gage height, 2.07 ft (0.631 m) Aug. 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	31	63	37	31	120	321	218	28	21	9.5	31
2	25	32	54	37	31	110	329	203	31	24	9.5	32
3	25	43	48	37	31	100	353	179	31	24	10	32
4	24	41	44	37	31	167	370	162	30	23	10	30
5	24	38	42	37	31	306	379	145	29	22	13	27
6	34	35	40	36	31	364	396	133	30	21	15	25
7	43	34	40	36	31	387	393	121	29	22	16	22
8	45	40	39	35	31	413	385	107	30	20	16	21
9	45	47	39	35	31	442	365	96	30	18	17	17
10	44	45	39	34	32	477	339	83	29	16	17	15
11	44	41	39	34	34	495	307	74	28	15	17	13
12	42	42	38	33	35	506	286	65	29	13	17	12
13	40	43	37	32	36	506	262	59	29	12	16	13
14	40	41	37	32	37	495	242	57	29	12	16	14
15	37	39	37	31	38	473	218	53	27	11	16	15
16	37	38	37	31	39	441	196	49	26	11	15	17
17	36	37	37	31	39	416	179	45	24	10	13	18
18	36	38	37	31	39	396	163	43	23	9.8	13	27
19	41	39	37	31	39	359	149	42	23	8.8	12	55
20	42	40	37	31	39	330	140	40	23	8.2	11	95
21	42	40	37	31	39	307	138	37	22	9.0	9.9	100
22	42	49	37	31	42	290	140	35	21	8.2	9.3	88
23	44	60	37	31	50	277	141	33	19	6.4	9.4	78
24	46	56	37	31	70	269	134	32	18	5.6	9.2	73
25	48	53	37	31	120	261	134	31	17	6.0	9.1	80
26	55	55	37	31	130	250	152	29	17	5.4	8.8	87
27	52	61	37	31	130	239	160	27	16	5.4	8.2	86
28	43	66	37	31	125	241	185	26	15	5.0	7.5	79
29	38	67	37	31	---	258	211	26	15	5.6	13	69
30	34	67	37	31	---	284	225	24	19	6.8	23	62
31	33	---	37	31	---	307	---	24	---	7.2	28	---
TOTAL	1206	1358	1228	1019	1392	10286	7392	2298	737	392.4	414.4	1333
MEAN	38.9	45.3	39.6	32.9	49.7	332	246	74.1	24.6	12.7	13.4	44.4
MAX	55	67	63	37	130	506	396	218	31	24	28	100
MIN	24	31	37	31	31	100	134	24	15	5.0	7.5	12
CFSM	.09	.10	.09	.08	.12	.77	.57	.17	.06	.03	.03	.10
IN.	.10	.12	.11	.09	.12	.88	.63	.20	.06	.03	.04	.11

CAL YR 1976 TOTAL 153406.0 MEAN 419 MAX 4740 MIN 21 CFSM .97 IN 13.15
WTR YR 1977 TOTAL 29055.8 MEAN 79.6 MAX 506 MIN 5.0 CFSM .18 IN 2.49

04116000 GRAND RIVER AT IONIA, MI

LOCATION.--Lat 42°58'20", long 85°04'13", in NW¼ sec.30, T.7 N., R.6 W., Ionia County, Hydrologic Unit 04050006, on left bank 15 ft (5 m) downstream from bridge on State Highway 66 at Ionia, 2.7 mi (4.3 km) downstream from Prairie Creek, and at mile 87 (140 km).

DRAINAGE AREA.--2,840 mi² (7,360 km²), approximately.

PERIOD OF RECORD.--March to June 1931, July and September 1931 (fragmentary), July 1951 to current year. Gage-height records for flood seasons collected in this vicinity 1907-28 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 615.38 ft (187.568 m) above mean sea level. Mar. 19 to Sept. 24, 1931, nonrecording gage at site 1.5 mi (2.4 km) upstream at different datum.

REMARKS.--Records good except for the winter period, which are fair. Diurnal fluctuation below about 5,000 ft³/s (142 m³/s) caused by powerplants above station. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--26 years (water years 1952-77), 1,881 ft³/s (53.27 m³/s), 8.99 in/yr (228 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 21,500 ft³/s (609 m³/s) Apr. 1, 1960, gage height, 23.43 ft (7.141 m); minimum, 40 ft³/s (1.13 m³/s) May 13, 1968, gage height, 5.61 ft (1.710 m); minimum daily, 109 ft³/s (3.09 m³/s) July 16, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,540 ft³/s (129 m³/s) Apr. 1, gage height, 13.85 ft (4.221 m); maximum gage height, 15.09 ft (4.599 m) Mar. 6, backwater from ice; minimum discharge, 106 ft³/s (3.00 m³/s) July 20, gage height, 6.28 ft (1.914 m); minimum daily, 109 ft³/s (3.09 m³/s) July 16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	544	775	680	450	310	1700	4330	2700	520	770	428	544
2	626	783	660	530	480	1600	4200	2480	540	667	229	537
3	491	701	630	600	420	1500	4150	2220	570	545	307	553
4	526	689	620	470	480	2000	4090	2120	509	552	412	462
5	491	703	750	470	450	3500	4170	2210	421	513	433	359
6	725	781	800	550	300	3600	3800	1980	492	459	360	418
7	962	760	820	500	480	3500	3450	1780	695	503	304	422
8	977	635	680	350	320	3400	3210	1700	768	625	335	314
9	642	685	600	580	550	3600	2950	1430	533	480	337	381
10	639	691	650	500	500	3910	2780	985	611	446	474	296
11	740	637	600	450	650	3870	2620	1200	630	330	625	363
12	987	628	600	500	780	3710	2440	1030	595	281	447	314
13	659	675	600	500	650	3490	2310	1180	741	276	337	364
14	675	626	450	650	680	3300	2140	950	581	139	288	273
15	676	628	550	570	720	3100	2130	770	518	113	387	571
16	647	643	700	350	400	2950	1990	600	544	109	407	551
17	571	617	600	530	500	2910	1900	920	563	111	396	547
18	524	604	550	330	580	2810	1840	870	575	110	292	725
19	500	608	600	530	660	2700	1800	800	826	110	366	762
20	556	648	520	470	640	2570	1740	550	1310	136	268	773
21	629	583	600	530	600	2500	1710	650	717	420	246	808
22	599	573	600	600	650	2590	1810	800	793	416	359	666
23	582	625	640	590	730	2450	1740	900	1020	337	314	684
24	645	679	600	500	900	2430	1860	650	646	289	303	830
25	586	688	630	480	2000	2420	2120	550	624	198	232	805
26	605	692	570	360	1800	2630	3190	1000	436	305	341	1000
27	658	709	520	540	2100	3540	3240	650	669	317	263	640
28	653	926	500	500	1700	4050	3210	550	359	366	310	580
29	609	800	570	420	---	3610	3020	500	320	317	605	680
30	476	700	480	300	---	3560	2810	250	691	416	491	700
31	506	---	350	580	---	3720	---	470	---	384	548	---
TOTAL	19706	20492	18720	15280	21030	93220	82750	35445	18817	11040	11444	16922
MEAN	636	683	604	493	751	3007	2758	1143	627	356	369	564
MAX	987	926	820	650	2100	4050	4330	2700	1310	770	625	1000
MIN	476	573	350	300	300	1500	1710	250	320	109	229	273
CFSM	.22	.24	.21	.17	.26	1.06	.97	.40	.22	.13	.13	.20
IN.	.26	.27	.25	.20	.28	1.22	1.08	.46	.25	.14	.15	.22

CAL YR 1976 TOTAL 987442 MEAN 2698 MAX 20200 MIN 345 CFSM .95 IN 12.93
WTR YR 1977 TOTAL 364866 MEAN 1000 MAX 4330 MIN 109 CFSM .35 IN 4.78

04116500 FLAT RIVER AT SMYRNA, MI

LOCATION.--Lat 43°03'10", long 85°15'50", in NW¼ sec.28, T.8 N., R.8 W., Ionia County, Hydrologic Unit 04050006, on right bank at downstream side of highway bridge, 600 ft (183 m) downstream from dam and inactive powerplant, and 0.5 mi (0.8 km) south of Smyrna.

DRAINAGE AREA.--528 mi² (1,368 km²).

PERIOD OF RECORD.--October 1950 to current year. Monthly discharge only for some periods, published in WSP 1727.

GAGE.--Water-stage recorder. Datum of gage is 729.53 ft (222.361 m) above mean sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplants above station prior to September 1956; occasional diurnal fluctuation since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--27 years, 434 ft³/s (12.29 m³/s), 11.16 in/yr (283 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,100 ft³/s (87.8 m³/s) Apr. 22, 1967, gage height, 7.27 ft (2.216 m), caused by momentary release of water from storage above station; maximum gage height, 8.26 ft (2.518 m) Feb. 6, 1974, backwater from ice; minimum discharge, 7.4 ft³/s (0.21 m³/s) Sept. 9, 1953; minimum daily, 70 ft³/s (1.98 m³/s) Sept. 6, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,150 ft³/s (32.6 m³/s) Mar. 14, gage height, 5.33 ft (1.625 m); maximum gage height, 6.25 ft (1.905 m) Dec. 29, backwater from ice; minimum discharge, 110 ft³/s (3.12 m³/s) July 28, gage height, 3.06 ft (0.933 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	264	306	280	250	265	446	687	398	211	231	126	222
2	258	312	270	250	261	417	722	380	219	204	124	227
3	259	303	260	240	259	422	738	363	209	181	125	257
4	258	301	260	240	256	580	717	345	196	214	130	230
5	249	297	260	240	254	681	708	356	195	230	142	216
6	311	294	260	230	255	725	671	360	229	206	152	209
7	324	290	260	230	250	773	642	344	229	188	155	200
8	332	286	260	230	246	793	610	323	223	179	163	190
9	318	284	255	230	244	864	576	313	217	172	158	181
10	310	287	250	230	246	902	547	303	213	157	196	170
11	302	286	250	230	250	969	519	281	227	150	184	163
12	293	282	250	240	252	1060	486	248	244	148	177	159
13	284	275	240	240	258	1120	453	264	261	147	170	164
14	277	274	240	240	271	1150	435	259	254	143	195	167
15	269	273	240	250	308	1110	374	245	226	137	182	169
16	263	270	240	250	306	1040	332	241	209	134	176	178
17	260	268	240	250	312	955	338	236	198	135	169	180
18	258	273	240	260	247	896	349	233	222	144	166	225
19	263	276	240	260	240	833	347	229	200	153	160	347
20	267	275	240	250	240	783	395	219	191	150	155	410
21	275	276	240	250	240	740	472	217	184	147	151	443
22	281	279	240	250	241	673	513	215	175	139	154	508
23	280	277	240	240	253	679	501	211	167	129	186	498
24	283	273	240	240	389	642	488	209	165	123	156	517
25	287	272	240	230	442	615	565	225	163	127	149	513
26	288	293	240	240	480	593	573	222	159	128	145	487
27	282	362	250	240	508	571	576	206	155	123	142	461
28	277	389	250	250	478	565	522	195	152	116	146	414
29	275	317	250	250	---	665	472	182	150	123	247	387
30	280	290	250	255	---	670	424	176	171	130	224	346
31	303	---	250	263	---	687	---	185	---	129	210	---
TOTAL	8730	8740	7725	7548	8251	23619	15752	8183	6014	4817	5115	8838
MEAN	282	291	249	243	295	762	525	264	200	155	165	295
MAX	332	389	280	263	508	1150	738	398	261	231	247	517
MIN	249	268	240	230	240	417	332	176	150	116	124	159
CFSM	.53	.55	.47	.46	.56	1.44	.99	.50	.38	.29	.31	.56
IN.	.62	.62	.54	.53	.58	1.66	1.11	.58	.42	.34	.36	.62

CAL YR 1976 TOTAL 227904 MEAN 623 MAX 2580 MIN 222 CFSM 1.18 IN 16.06
WTR YR 1977 TOTAL 113332 MEAN 310 MAX 1150 MIN 116 CFSM .59 IN 7.98

04117500 THORNAPPLE RIVER NEAR HASTINGS, MI

LOCATION.--Lat 42°36'57", long 85°14'11", in SE¼ sec.27, T.3 N., R.8 W., Barry County, Hydrologic Unit 04050007, on downstream side of highway bridge, 0.6 mi (1.0 km) downstream from Cedar Creek, 2.0 mi (3.2 km) downstream from Thornapple Lake, and 3.2 mi (5.1 km) southeast of Hastings.

DRAINAGE AREA.--385 mi² (997 km²).

PERIOD OF RECORD.--October 1944 to current year.

GAGE.--Water-stage recorder. Datum of gage is 786.71 ft (239.789 m) above mean sea level (levels by Michigan Department of Natural Resources). Prior to Oct. 1, 1965, nonrecording gage at same site and datum.

REMARKS.--Records good. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--33 years, 308 ft³/s (8.723 m³/s), 10.86 in/yr (276 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,810 ft³/s (193 m³/s) Apr. 7, 1947, gage height, 10.20 ft (3.109 m), from graph based on gage readings; minimum, 33 ft³/s (0.93 m³/s) Aug. 10, 1964, gage height, 2.71 ft (0.826 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 785 ft³/s (22.2 m³/s) Mar. 10, gage height, 4.65 ft (1.417 m); minimum,65 ft³/s (1.84 m³/s) July 15, Aug. 27, 28; minimum gage height, 2.81 ft (0.856 m) Aug. 27, 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	106	151	165	116	130	413	662	362	90	108	75	142
2	100	150	165	114	130	355	651	310	96	111	73	153
3	97	147	147	114	133	323	658	272	94	105	72	151
4	93	142	142	114	130	353	685	248	90	106	70	137
5	92	136	139	113	130	533	706	240	101	116	75	132
6	122	132	137	113	130	711	709	233	128	123	78	122
7	161	132	137	112	125	758	670	217	136	117	81	113
8	174	128	133	113	125	760	606	197	128	104	84	106
9	162	125	131	115	124	772	526	182	121	95	89	97
10	146	125	130	115	120	777	450	169	116	86	95	92
11	135	125	129	115	121	758	391	161	111	80	98	88
12	128	122	128	120	124	729	350	154	112	77	97	84
13	118	120	126	120	133	702	313	149	111	75	94	103
14	115	120	119	122	142	680	287	146	107	73	88	143
15	108	120	118	123	145	637	263	140	101	70	86	165
16	107	118	118	125	144	569	245	134	93	70	84	182
17	105	118	118	130	138	506	234	131	95	72	82	187
18	105	119	121	133	133	454	222	135	142	76	79	181
19	105	120	123	133	131	408	215	136	191	85	75	176
20	109	122	128	131	130	388	213	130	189	84	73	162
21	114	121	126	128	124	376	241	122	157	84	72	148
22	122	121	123	123	124	363	259	113	129	85	74	136
23	127	121	128	120	133	362	313	107	109	85	73	126
24	126	120	126	115	181	370	356	104	99	82	73	139
25	125	121	126	115	314	370	398	101	94	80	72	193
26	124	131	126	115	430	368	491	97	88	75	69	225
27	120	178	123	125	474	371	559	92	84	72	66	227
28	117	219	124	125	456	399	570	88	79	68	69	198
29	117	217	124	130	---	480	515	85	82	72	128	175
30	122	182	122	130	---	579	434	79	90	79	161	158
31	139	---	120	130	---	648	---	81	---	76	151	---
TOTAL	3741	4103	4022	3747	4854	16272	13192	4915	3363	2691	2656	4441
MEAN	121	137	130	121	173	525	440	159	112	86.8	85.7	148
MAX	174	219	165	133	474	777	709	362	191	123	161	227
MIN	92	118	118	112	120	323	213	79	79	68	66	84
CFSM	.31	.36	.34	.31	.45	1.36	1.14	.41	.29	.23	.22	.38
IN.	.36	.40	.39	.36	.47	1.57	1.27	.47	.32	.26	.26	.43

CAL YR 1976 TOTAL 127750 MEAN 349 MAX 2510 MIN 77 CFSM .91 IN 12.34
WTR YR 1977 TOTAL 67997 MEAN 186 MAX 777 MIN 66 CFSM .48 IN 6.57

04118000 THORNAPPLE RIVER NEAR CALEDONIA, MI

LOCATION.--Lat 42°48'40", long 85°29'00", in NW¼ sec.22, T.5 N., R.10 W., Kent County, Hydrologic Unit 04050007, on right bank 200 ft (61 m) downstream from LaBarge powerplant, 2.3 mi (3.7 km) northeast of Caledonia, and 3.3 mi (5.3 km) downstream from Coldwater River.

DRAINAGE AREA.--773 mi² (2,002 km²).

PERIOD OF RECORD.--October 1930 to September 1938, October 1951 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 824: 1931-36. WSP 1307: 1931-37.

GAGE.--Water-stage recorder. Datum of gage is 676.31 ft (206.139 m) above mean sea level, unadjusted (Consumers Power Co. bench mark). Oct. 1, 1930 to Sept. 30, 1938, nonrecording gage at same site and mean sea level datum (unadjusted).

REMARKS.--Records good except those for the winter period, which are fair. Prior to Dec. 1, 1958, large diurnal fluctuation at low and medium flow caused by powerplant above station; occasional fluctuation since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--34 years, 565 ft³/s (16.00 m³/s), 9.93 in/yr (252 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,290 ft³/s (178 m³/s) May 10, 1956, gage height, 10.79 ft (3.289 m); maximum gage height, 10.96 ft (3.341 m) Apr. 22, 1975; minimum discharge, 1.0 ft³/s (0.028 m³/s) May 28, 1968, gage height, 1.40 ft (0.427 m), result of regulation during bridge construction.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 7, 1947, reached a stage of 14.4 ft (4.39 m) from information by powerplant operator.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,580 ft³/s (44.7 m³/s) Mar. 10, gage height, 5.55 ft (1.692 m); minimum, 146 ft³/s (4.13 m³/s) Aug. 26, gage height, 2.72 ft (0.829 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	296	384	420	320	310	753	1090	767	332	273	213	362
2	323	389	390	320	310	671	1160	655	279	279	199	352
3	268	377	370	310	310	646	1340	600	312	277	202	341
4	285	363	360	310	300	883	1290	548	284	315	204	335
5	249	353	350	310	300	1240	1280	532	268	321	211	306
6	378	344	340	320	300	1240	1250	513	356	298	227	296
7	374	335	340	320	300	1310	1210	493	351	289	232	288
8	399	332	330	320	300	1340	1130	454	337	287	239	251
9	399	322	330	320	300	1460	1020	429	328	241	226	267
10	367	320	320	330	300	1560	912	398	313	275	277	228
11	341	319	320	330	300	1500	826	391	315	225	255	250
12	339	315	310	330	300	1460	731	373	311	230	257	214
13	368	312	310	330	300	1450	677	369	298	234	246	252
14	297	306	300	330	300	1340	634	367	294	204	249	296
15	293	304	300	340	300	1250	578	322	291	205	206	333
16	306	301	300	340	300	1150	585	309	250	208	224	406
17	310	302	300	340	300	1030	512	343	264	210	230	390
18	306	298	300	340	300	965	514	319	380	221	221	399
19	315	300	300	340	300	900	497	337	398	215	205	403
20	326	300	300	340	300	822	485	319	395	235	204	376
21	341	303	300	340	300	829	543	301	380	219	211	338
22	352	302	300	330	320	809	574	286	344	269	206	322
23	361	296	300	330	350	791	638	275	290	223	202	311
24	371	294	300	330	500	768	699	282	288	223	211	356
25	370	297	310	330	700	754	783	279	280	241	198	440
26	360	310	310	330	775	763	951	264	252	217	196	449
27	350	390	320	330	817	747	999	254	242	216	202	459
28	339	436	330	320	798	791	994	236	218	208	197	429
29	333	438	320	320	---	977	934	251	247	214	351	378
30	332	440	320	320	---	1040	888	226	252	240	334	339
31	376	---	320	320	---	1070	---	295	---	216	339	---
TOTAL	10424	10082	10020	10140	10590	32309	25724	11787	9149	7520	7174	10166
MEAN	336	336	323	327	378	1042	857	380	305	243	231	339
MAX	399	440	420	340	817	1560	1340	767	398	321	351	459
MIN	249	294	300	310	300	646	485	226	218	200	196	214
CFSM	.44	.44	.42	.42	.49	1.35	1.11	.49	.40	.31	.30	.44
IN.	.50	.49	.48	.49	.51	1.55	1.24	.57	.44	.36	.35	.49

CAL YR 1976 TOTAL 286130 MEAN 782 MAX 4470 MIN 212 CFSM 1.01 IN 13.77
WTR YR 1977 TOTAL 155085 MEAN 425 MAX 1560 MIN 196 CFSM .55 IN 7.46

04118500 ROGUE RIVER NEAR ROCKFORD, MI

LOCATION.--Lat 43°05'00", long 85°35'30", in NE¼ sec.15, T.8 N., R.11 W., Kent County, Hydrologic Unit 04050006, on left bank at downstream side of highway bridge, 2.2 mi (3.5 km) upstream from mouth, and 3.0 mi (4.8 km) southwest of Rockford.

DRAINAGE AREA.--234 mi² (606 km²).

PERIOD OF RECORD.--February 1952 to current year.

GAGE.--Water-stage recorder. Datum of gage is 625.2 ft (190.56 m) above mean sea level (levels by Blass Survey Co.). Prior to August 30, 1952, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Some diurnal fluctuation caused by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 227 ft³/s (6.429 m³/s), 13.17 in/yr (335 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,540 ft³/s (100 m³/s) Mar. 6, 1976, gage height, 9.29 ft (2.832 m); minimum, 28 ft³/s (0.79 m³/s) Jan. 22, 1967, gage height, 3.41 ft (1.039 m); minimum daily, 49 ft³/s (1.39 m³/s) Aug. 27, 1955.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 711 ft³/s (20.1 m³/s) Mar. 11, gage height, 6.16 ft (1.878 m); minimum, 76 ft³/s (2.15 m³/s) July 28, 29, Aug. 2, 3, gage height, 3.65 ft (1.113 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	122	153	145	130	140	184	417	196	119	113	78	105
2	121	155	145	130	140	202	407	180	124	106	76	118
3	120	157	140	130	140	199	363	169	120	99	77	127
4	117	155	140	125	140	267	344	162	112	123	78	122
5	114	152	140	125	140	319	367	177	111	138	87	111
6	147	151	140	125	140	272	362	181	148	152	93	101
7	140	148	140	125	140	300	347	183	151	150	96	97
8	141	143	135	125	135	376	324	175	135	116	97	94
9	147	142	135	125	130	483	300	158	118	106	96	92
10	144	142	135	125	130	583	275	148	109	99	110	89
11	139	141	135	125	130	672	249	142	120	93	111	88
12	135	139	135	125	130	685	231	137	132	89	108	85
13	133	140	135	130	135	673	219	132	137	87	100	87
14	133	140	130	130	140	635	209	128	128	84	111	88
15	133	138	130	135	150	568	200	124	118	83	99	90
16	133	137	130	140	150	475	196	118	110	81	93	95
17	133	138	130	140	140	403	190	114	103	81	91	94
18	132	140	130	140	130	366	185	113	103	89	88	119
19	136	141	130	140	130	341	181	110	100	94	86	166
20	139	142	130	140	130	326	202	107	97	92	85	189
21	143	143	130	135	130	314	216	104	94	89	85	192
22	144	141	130	135	140	315	212	111	91	86	85	209
23	144	140	130	130	152	314	208	128	88	83	87	212
24	147	138	135	130	210	307	209	143	86	81	85	238
25	145	139	135	130	205	297	302	121	87	81	84	225
26	141	154	135	130	177	284	261	108	86	81	84	188
27	139	190	135	130	176	269	262	102	84	79	83	176
28	138	183	135	135	177	280	265	97	83	77	84	167
29	137	168	135	140	---	357	248	94	85	77	117	155
30	141	146	135	140	---	396	219	93	94	77	109	156
31	158	---	135	140	---	423	---	105	---	79	110	---
TOTAL	4236	4436	4180	4085	4107	11885	7970	4160	3273	2965	2873	4075
MEAN	137	148	135	132	147	383	266	134	109	95.6	92.7	136
MAX	158	190	145	140	210	685	417	196	151	152	117	238
MIN	114	137	130	125	130	184	181	93	83	77	76	85
CFSM	.59	.63	.58	.56	.63	1.64	1.14	.57	.47	.41	.40	.58
IN.	.67	.71	.66	.65	.65	1.89	1.27	.66	.52	.47	.46	.65

CAL YR 1976 TOTAL 116291 MEAN 318 MAX 3290 MIN 101 CFSM 1.36 IN 18.49
WTR YR 1977 TOTAL 58245 MEAN 160 MAX 685 MIN 76 CFSM .68 IN 9.26

04119000 GRAND RIVER AT GRAND RAPIDS, MI

LOCATION.--Lat 42°57'52", long 85°40'35", in NE¼ sec.25, T.7 N., R.12 W., Kent County, Hydrologic Unit 04050006, on right bank 500 ft (152 m) upstream from bridge on Fulton Street, 1.7 mi (2.7 km) upstream from Plaster Creek, and at mile 41 (66 km).

DRAINAGE AREA.--4,900 mi² (12,700 km²), approximately.

PERIOD OF RECORD.--March 1901 to December 1905, January 1906 to August 1918 (gage heights only), October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height records collected in this vicinity since 1907 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 924: 1938(M). WSP 1387: 1901-5, 1940.

GAGE.--Water-stage recorder. Datum of gage is 585.70 ft (178.521 m) above mean sea level (levels by City of Grand Rapids). March 1901 to August 1918, nonrecording gage at Fulton Street Bridge 500 ft (152 m) downstream and Oct. 1, 1930, to Oct. 26, 1953, water-stage recorder at sewage pumping station 1 mi (1.6 km) downstream at datum 2.99 ft (0.911 m) higher.

REMARKS.--Records good except those for the winter period, which are fair. Moderate diurnal fluctuation at low and medium flow caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--51 years, 3,551 ft³/s (100.6 m³/s), 9.84 in/yr (250 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 54,000 ft³/s (1,530 m³/s) Mar. 28, 1904, gage height, 19.5 ft (5.94 m), from graph based on gage readings, site then in use; minimum daily, 381 ft³/s (10.8 m³/s) Aug. 9, 17, 1936.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1901, 54,000 ft³/s (1,530 m³/s) Mar. 28, 1904.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 9,290 ft³/s (263 m³/s) Mar. 10, gage height, 9.64 ft (2.938 m); minimum 650 ft³/s (18.4 m³/s) July 16, 17; minimum gage height, 2.68 ft (0.817 m) July 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1410	1630	1560	1400	1400	3690	6000	4310	1310	1520	1070	1680
2	1490	1900	1900	1400	1400	3400	6050	4060	1440	1740	1130	1740
3	1560	2040	1800	1500	1400	3300	6330	3530	1340	1590	970	1710
4	1370	2200	1700	1500	1400	4430	6720	3270	1380	1680	932	1750
5	1380	2150	1700	1400	1400	5360	6780	3560	1350	1570	1050	1590
6	1570	1960	1800	1400	1400	6030	6630	3620	1360	1490	1170	1400
7	1830	1920	1900	1500	1400	6340	6490	3410	1430	1410	1120	1340
8	2080	1590	1900	1500	1400	6640	6370	3220	1660	1350	1040	1260
9	2180	1380	1800	1500	1400	7610	6000	3130	1670	1480	1110	1190
10	1890	1690	1700	1500	1400	8500	5550	2870	1420	1240	1270	1130
11	1770	1790	1700	1500	1500	7660	5070	2600	1520	1150	1300	1110
12	1830	1700	1600	1500	1600	7410	4460	2640	1470	996	1510	1070
13	2040	1720	1600	1500	1800	7340	4710	2500	1460	940	1390	1150
14	1760	1720	1600	1500	1800	7230	4270	2400	1600	882	1310	1150
15	1670	1690	1500	1500	1700	6910	3960	2300	1450	772	1100	1200
16	1680	1700	1500	1500	1700	6470	3780	2100	1290	674	1080	1580
17	1680	1670	1500	1500	1600	6050	3580	1900	1240	722	1180	1690
18	1590	1690	1500	1500	1600	5760	3460	1800	1380	873	1160	1890
19	1520	1690	1500	1500	1600	5460	3380	1700	1460	787	1080	2200
20	1510	1750	1500	1500	1700	5290	3660	1700	1750	728	1020	2160
21	1550	1750	1500	1500	1600	5140	3720	1600	2230	798	1040	2220
22	1650	1690	1500	1500	1600	4970	3500	1600	1750	1040	945	2300
23	1690	1630	1500	1500	1600	4780	3480	1800	1710	1130	994	2130
24	1650	1720	1500	1500	2300	4650	3480	1900	1860	1080	1060	2380
25	1760	1800	1500	1500	3900	4590	4160	1600	1500	1030	1020	2590
26	1720	1920	1500	1400	4100	4460	4550	1500	1380	833	960	2400
27	1670	2120	1500	1400	4100	4380	5450	2000	1070	900	976	2500
28	1720	2180	1500	1400	3800	4510	5970	1600	1330	941	1090	2330
29	1750	2350	1400	1400	---	5170	5560	1400	1010	1000	1520	2170
30	1740	1660	1360	1400	---	5830	5050	1300	1040	1080	1880	2130
31	1710	---	1360	1400	---	6230	---	1000	---	1040	1710	---
TOTAL	52420	54400	49380	45500	53600	175590	148170	73920	43860	34486	36187	53140
MEAN	1691	1813	1593	1468	1914	5664	4939	2385	1462	1112	1167	1771
MAX	2180	2350	1900	1500	4100	8500	6780	4310	2230	1740	1880	2590
MIN	1370	1380	1360	1400	1400	3300	3380	1000	1010	674	932	1070
CFSM	.35	.37	.33	.30	.39	1.16	1.01	.49	.30	.23	.24	.36
IN.	.40	.41	.37	.35	.41	1.33	1.12	.56	.33	.26	.27	.40

CAL YR 1976 TOTAL 1803850 MEAN 4929 MAX 28100 MIN 1120 CFSM 1.01 IN 13.69
WTR YR 1977 TOTAL 820633 MEAN 2248 MAX 8500 MIN 674 CFSM .46 IN 6.23

04119300 GRAND RIVER AT EASTMANVILLE, MI

LOCATION.--Lat 43°00'53", long 85°57'21", in NE¼ NW¼ sec.10, T.7 N., R.14 W., Ottawa County, Hydrologic Unit 04050006, on left bank at downstream side of bridge on 68th Avenue at Eastmanville, 1.1 mi (1.8 km) downstream from Deer Creek, and at mile 19.3 (31.1 km).

DRAINAGE AREA.--5,230 mi² (13,550 km²), approximately.

PERIOD OF RECORD.--March 1976 to September 1977 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 573.09 ft (174.678 m) above mean sea level.

REMARKS.--Records fair. Some regulation at low flow by powerplants upstream. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 29,600 ft³/s (838 m³/s) Mar. 9, 1976, gage height, 17.73 ft (5.404 m); minimum daily, 750 ft³/s (21.2 m³/s) July 17, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 10,800 ft³/s (306 m³/s) Mar. 10, gage height, 11.71 ft (3.569 m); minimum daily, 750 ft³/s (21.2 m³/s) July 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1500	1740	1670	1500	1600	3940	7000	4890	1490	1200	1110	1800
2	1590	2030	2100	1500	1600	3900	7100	4590	1480	1770	1130	1800
3	1670	2180	2100	1500	1550	3900	7300	4040	1420	1770	1150	1800
4	1460	2350	1800	1500	1500	4500	7700	3820	1440	1980	1160	1800
5	1470	2290	1800	1500	1500	5700	7800	3900	1500	1840	1180	1800
6	1680	2090	1900	1500	1500	6600	7700	3910	1500	1780	1200	1600
7	1950	2050	2000	1500	1500	7200	7500	3720	1500	1600	1220	1300
8	2220	1700	2000	1500	1500	7400	7300	3600	1600	1500	1220	1300
9	2330	1470	1900	1500	1500	7960	6800	3500	1830	1500	1180	1300
10	2020	1800	1800	1500	1500	10600	6300	3300	1660	1400	1440	1200
11	1890	1910	1800	1500	1600	10200	5800	3000	1600	1300	1400	1200
12	1950	1810	1700	1500	1700	9530	5200	2800	1600	1200	1500	1200
13	2180	1840	1700	1500	1900	9330	5400	2800	1600	1100	1500	1350
14	1880	1840	1700	1500	1900	8960	4880	2700	1600	1000	1400	1280
15	1780	1800	1600	1500	1800	8450	4480	2600	1700	900	1300	1250
16	1790	1810	1600	1500	1800	7880	4270	2500	1600	800	1250	1530
17	1790	1780	1600	1500	1700	6980	4140	2300	1400	750	1270	1550
18	1700	1800	1600	1500	1700	6600	4060	1940	1400	800	1200	1680
19	1620	1800	1600	1500	1700	6200	3940	1890	1500	900	1200	1960
20	1610	1870	1600	1500	1800	6000	4150	1860	2040	850	1100	2140
21	1650	1870	1600	1500	1700	5900	4480	1820	2180	800	1070	2300
22	1760	1800	1600	1500	1700	5700	4270	1730	2060	900	1030	2400
23	1800	1740	1600	1500	1700	5500	4120	1670	2040	1190	1030	2400
24	1760	1640	1600	1500	2000	5300	4150	1900	1900	1110	1110	2400
25	1880	1920	1600	1500	2900	5200	4610	2000	1800	1210	1010	2680
26	1840	2050	1600	1500	4200	5100	5130	1700	1600	1020	1030	2530
27	1780	2260	1600	1550	4200	5000	5580	1600	1400	995	1020	2500
28	1840	2330	1600	1600	4000	5400	6400	2000	1200	1010	1030	2500
29	1870	2510	1500	1600	---	6000	6340	1700	1400	1070	1280	2400
30	1860	1770	1500	1600	---	6800	5640	1500	1200	1100	1700	2290
31	1830	---	1500	1600	---	7200	---	1400	---	1180	2000	---
TOTAL	55950	58050	52870	46950	55250	204930	169540	82680	48240	37525	38420	55240
MEAN	1805	1935	1705	1515	1973	6611	5651	2667	1608	1210	1239	1841
MAX	2330	2510	2100	1600	4200	10600	7800	4890	2180	1980	2000	2680
MIN	1460	1470	1500	1500	1500	3900	3940	1400	1200	750	1010	1200
CFSM	.35	.37	.33	.29	.38	1.26	1.08	.51	.31	.23	.24	.35
IN.	.40	.41	.38	.33	.39	1.46	1.21	.59	.34	.27	.27	.39

WTR YR 1977 TOTAL 905645 MEAN 2481 MAX 10600 MIN 750 CFSM .47 IN 6.44

STREAMS TRIBUTARY TO LAKE MICHIGAN

04121300 CLAM RIVER AT VOGEL CENTER, MI

LOCATION.--Lat 44°12'02", long 85°03'10", in SW¼ NW¼ sec.21, T.21 N., R.6 W., Missaukee County, Hydrologic Unit 04060102, on left bank 10 ft (3 m) downstream from bridge on county road, 0.5 mi (0.8 km) north of Vogel Center, and 3.5 mi (5.6 km) southeast of Falmouth.

DRAINAGE AREA.--243 mi² (629 km²).

PERIOD OF RECORD.--June 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,130 ft (344 m) from topographic map.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation at low flow by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--11 years, 128 ft³/s (3.625 m³/s), 7.15 in/yr (182 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,150 ft³/s (32.6 m³/s) Apr. 13, 1971, gage height, 6.33 ft (1.929 m); minimum, 29 ft³/s (0.82 m³/s) Nov. 3, 1969, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 410 ft³/s (11.6 m³/s) Mar. 15, gage height, 4.34 ft (1.323 m), only peak above base of 350 ft³/s (9.91 m³/s); minimum, 45 ft³/s (1.27 m³/s) June 27, 28, July 18, 23, 28; minimum gage height, 2.36 ft (0.719 m) Feb. 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	63	82	68	60	62	68	209	79	59	54	60	58
2	62	78	66	60	62	68	211	78	61	52	61	57
3	61	74	72	60	62	69	258	78	60	53	58	59
4	61	72	72	59	62	77	274	76	58	57	58	63
5	61	71	71	58	62	86	250	78	58	61	60	79
6	70	71	69	58	62	90	234	78	63	59	66	83
7	78	70	65	58	62	85	218	86	66	58	67	74
8	75	70	63	59	60	82	203	76	63	58	66	65
9	70	72	66	61	59	89	184	72	61	54	60	59
10	67	72	66	62	58	110	138	72	60	52	58	58
11	65	71	66	64	56	126	121	71	62	52	57	55
12	64	72	66	65	59	186	111	71	63	52	57	54
13	63	71	65	66	60	316	111	69	63	52	55	57
14	63	69	67	66	60	393	135	68	62	51	55	57
15	63	69	63	66	60	400	148	67	59	52	55	54
16	64	69	63	66	61	386	152	66	57	51	63	55
17	64	71	65	66	61	316	168	66	55	51	72	57
18	65	69	65	66	60	248	175	66	55	50	68	65
19	65	71	65	66	60	205	171	66	54	53	61	85
20	65	71	65	66	60	192	168	63	52	53	59	93
21	67	71	60	66	58	180	164	63	52	53	58	82
22	67	67	64	66	55	171	129	63	53	52	63	73
23	68	68	65	66	62	162	111	62	53	50	63	79
24	68	71	65	66	71	152	102	61	53	51	63	92
25	73	68	64	62	93	146	96	61	52	52	59	113
26	81	69	61	56	81	142	92	60	51	51	57	111
27	77	73	59	62	77	143	87	58	50	50	57	96
28	69	69	56	63	72	153	83	57	51	50	55	85
29	69	56	58	62	---	209	82	57	53	52	60	77
30	70	62	59	62	---	248	79	58	52	51	65	74
31	77	---	60	62	---	232	---	60	---	55	61	---
TOTAL	2095	2109	1999	1945	1777	5530	4664	2106	1711	1642	1877	2169
MEAN	67.6	70.3	64.5	62.7	63.5	178	155	67.9	57.0	53.0	60.5	72.3
MAX	81	82	72	66	93	400	274	86	66	61	72	113
MIN	61	56	56	56	55	68	79	57	50	50	55	54
CFSM	.28	.29	.27	.26	.26	.73	.64	.28	.24	.22	.25	.30
IN.	.32	.32	.31	.30	.27	.85	.71	.32	.26	.25	.29	.33

CAL YR 1976 TOTAL 57456 MEAN 157 MAX 910 MIN 56 CFSM .65 IN 8.80
WTR YR 1977 TOTAL 29624 MEAN 81.2 MAX 400 MIN 50 CFSM .33 IN 4.54

04121500 MUSKEGON RIVER AT EVART, MI

LOCATION.--Lat 43°53'57", long 85°15'19", in NW¼ NE¼ sec.3, T.17 N., R.8 W., Osceola County, Hydrologic Unit 04060102, on right bank 500 ft (152 m) downstream from bridge on U.S. Highway 10 in Evart, 0.4 mi (0.6 km) upstream from Twin Creek, and at mile 123.9 (199.4 km).

DRAINAGE AREA.--1,450 mi² (3,760 km²) approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1930 to September 1931, October 1933 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1437: 1934, 1947(M).

GAGE.--Water-stage recorder. Datum of gage is 977.72 ft (298.009 m) above mean sea level. Prior to Nov. 7, 1956, nonrecording gages at sites 400 ft (122 m) and 500 ft (152 m) upstream at present datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Some regulation during low flow from dams above station.

AVERAGE DISCHARGE.--45 years, 990 ft³/s (28.04 m³/s), 9.27 in/yr (235 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,790 ft³/s (221 m³/s) Mar. 29, 1976; maximum gage height, 14.42 ft (4.395 m) Apr. 9, 1959; minimum observed, 164 ft³/s (4.64 m³/s) Dec. 20, 1947, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,850 ft³/s (80.7 m³/s) Mar. 15, gage height, 9.55 ft (2.911 m); minimum, 202 ft³/s (5.72 m³/s) Nov. 30, gage height, 6.11 ft (1.862 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	392	484	390	480	450	660	1740	692	466	362	344	406
2	386	487	480	470	450	700	1670	692	486	363	346	460
3	387	488	540	470	460	563	1770	692	479	363	345	455
4	381	487	520	480	460	597	1980	671	470	369	343	430
5	377	474	500	490	460	676	2160	671	464	420	353	420
6	409	470	490	480	460	708	2120	671	467	413	363	430
7	436	470	490	470	460	720	2030	650	475	432	363	445
8	438	469	490	470	460	760	1930	636	471	428	388	440
9	431	462	500	460	460	882	1810	622	469	407	420	420
10	427	467	500	460	460	1110	1680	601	456	389	411	402
11	426	466	510	450	470	1400	1540	587	449	377	384	384
12	426	461	520	450	470	2000	1410	580	459	371	367	380
13	417	466	540	450	480	2510	1280	562	459	367	359	380
14	412	469	530	450	480	2630	1180	556	452	365	363	384
15	409	457	540	450	490	2790	1090	544	446	360	363	380
16	411	437	540	445	490	2770	1080	526	434	355	384	380
17	411	473	550	445	500	2570	1100	515	426	358	435	384
18	415	474	540	440	510	2430	1100	510	418	352	435	430
19	416	473	540	440	520	2270	1080	505	410	346	420	556
20	425	471	520	440	530	2200	1060	495	404	340	406	580
21	440	470	480	440	550	2140	1030	494	395	335	393	562
22	450	470	460	440	560	2010	1040	486	390	326	402	532
23	455	466	450	440	580	1910	992	477	387	318	416	514
24	465	458	470	440	600	1760	936	474	385	313	416	528
25	476	462	450	440	620	1620	912	465	382	315	416	623
26	460	474	470	445	640	1500	872	455	377	314	402	640
27	455	493	520	450	630	1420	832	446	370	305	398	622
28	451	489	470	430	640	1400	800	439	368	305	393	595
29	454	399	500	440	---	1720	752	430	367	308	398	565
30	455	256	480	445	---	1820	713	426	363	338	402	557
31	471	---	490	450	---	1820	---	432	---	352	402	---
TOTAL	13264	13842	15470	14050	14340	50066	39689	17002	12844	11066	12030	14284
MEAN	428	461	499	453	512	1615	1323	548	428	357	388	476
MAX	476	493	550	490	640	2790	2160	692	486	432	435	640
MIN	377	256	390	430	450	563	713	426	363	305	343	380
CFSM	.30	.32	.34	.31	.35	1.11	.91	.38	.30	.25	.27	.33
IN.	.34	.36	.40	.36	.37	1.28	1.02	.44	.33	.28	.31	.37

CAL YR 1976 TOTAL 494914 MEAN 1352 MAX 7710 MIN 256 CFSM .93 IN 12.70
WTR YR 1977 TOTAL 227947 MEAN 625 MAX 2790 MIN 256 CFSM .43 IN 5.85

04121500 MUSKEGON RIVER AT EVART, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1956 to current year.

INSTRUMENTATION.--Temperature recorder since November 1956.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 28.0°C July 1, 1963, July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 28.0°C July 20; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	14.0	10.5	5.5	4.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	14.0	11.0	5.5	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	14.5	12.0	6.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
4	14.5	12.0	4.5	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
5	14.5	12.0	4.5	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
6	13.0	10.5	4.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
7	10.5	9.0	4.0	3.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.0
8	10.5	8.5	3.5	1.5	0.5	0.5	0.0	0.0	0.0	0.0	0.5	0.0
9	9.5	8.0	1.5	1.5	0.5	0.5	0.0	0.0	0.0	0.0	0.5	0.0
10	8.5	8.0	2.0	2.0	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.0
11	9.5	7.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	11.5	8.5	1.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0
13	11.5	10.0	1.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.5
14	10.5	8.5	1.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.5
15	9.0	8.5	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	4.0	2.0
16	8.5	6.5	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	4.5	4.0
17	7.0	5.5	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	4.5	3.5
18	6.5	5.0	1.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	3.5	3.0
19	5.5	5.0	1.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	2.0
20	6.0	5.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	3.0
21	6.0	5.5	2.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	3.5	3.0
22	5.5	5.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	3.5
23	6.5	5.5	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	4.0	3.5
24	6.5	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	3.0
25	6.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	2.0
26	6.0	5.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	3.0
27	5.5	4.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	4.5	4.0
28	4.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	5.5	4.5
29	6.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	---	---	8.5	5.5
30	5.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	---	---	8.5	8.5
31	5.5	5.0	---	---	0.0	0.0	0.0	0.0	---	---	8.5	8.0
MONTH	14.5	3.5	6.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	8.5	0.0

04121500 MUSKEGON RIVER AT EVART, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	8.0	6.0	14.5	13.0	23.0	20.5	18.5	16.5	22.0	19.0	21.0	20.0
2	6.0	5.5	17.0	14.0	17.0	13.5	20.0	15.0	21.0	19.0	20.0	18.5
3	5.5	5.0	16.5	14.0	18.5	13.5	20.0	16.5	20.5	17.0	19.5	16.5
4	5.5	5.5	17.0	14.5	18.5	15.0	24.0	18.5	20.5	18.0	19.5	16.5
5	5.5	4.5	18.5	15.5	20.0	17.0	25.5	21.0	21.5	19.0	19.5	18.0
6	4.5	4.0	18.5	16.0	20.0	16.5	27.0	23.0	21.5	20.0	18.0	15.5
7	4.0	3.5	18.0	15.0	18.5	15.0	26.5	23.5	21.5	20.0	18.0	16.0
8	4.5	3.5	17.0	14.0	18.0	15.5	25.0	21.5	21.5	20.0	18.0	16.0
9	5.0	4.0	16.0	13.0	18.5	14.5	24.5	21.5	20.5	19.0	18.5	16.0
10	7.0	5.0	16.5	13.0	19.0	15.0	23.5	20.0	21.5	19.0	18.0	15.0
11	10.5	7.0	18.0	13.5	18.5	16.5	23.5	19.5	21.0	18.5	16.0	13.0
12	13.0	10.5	17.0	15.0	16.5	15.5	24.0	20.5	20.0	16.0	16.0	13.5
13	14.0	13.0	20.0	15.5	18.0	14.5	24.5	20.5	19.5	16.5	15.5	14.5
14	14.0	12.0	20.0	17.0	20.5	15.0	24.5	20.5	20.5	17.0	16.0	13.0
15	13.5	11.0	20.0	17.0	21.0	17.0	26.5	23.0	20.5	16.5	15.5	13.5
16	11.0	10.5	21.5	19.0	22.0	18.5	26.0	23.0	20.5	18.5	15.5	13.5
17	11.0	10.5	21.5	20.0	24.0	19.5	26.5	23.0	19.5	17.0	15.5	14.5
18	13.5	11.0	21.5	20.0	23.5	21.0	26.0	23.5	19.0	16.0	16.0	15.0
19	14.5	13.5	23.5	19.5	22.0	19.5	27.0	22.0	18.0	15.0	16.0	15.5
20	14.5	14.5	23.5	20.5	22.0	20.0	28.0	24.5	17.0	13.5	15.5	14.0
21	14.5	14.5	23.5	21.0	21.0	16.0	27.0	24.5	17.0	15.5	14.0	13.5
22	15.5	14.5	23.0	20.5	26.5	22.0	25.0	21.0	18.0	15.0	14.0	13.5
23	16.0	14.0	23.0	20.0	21.0	18.0	24.5	20.5	18.0	16.0	13.5	13.0
24	15.5	13.0	23.5	20.0	23.0	19.0	22.0	19.5	16.5	14.0	13.5	13.0
25	13.0	11.5	24.0	20.5	23.5	20.0	22.0	19.0	18.0	13.5	15.0	12.0
26	13.5	10.5	23.5	20.0	23.5	19.0	20.5	17.0	17.0	15.0	15.0	14.0
27	14.5	11.5	23.5	19.0	24.5	20.0	21.0	16.0	21.0	17.0	14.5	13.5
28	14.0	12.0	23.0	19.0	24.0	21.0	20.5	17.0	22.0	20.5	15.0	13.5
29	14.0	11.0	21.5	19.0	21.5	19.0	20.5	18.0	21.5	20.0	14.0	13.0
30	14.5	11.5	21.0	18.0	21.0	18.5	21.5	18.5	21.0	18.5	13.0	13.0
31	---	---	26.0	23.0	---	---	22.0	19.5	21.0	18.5	---	---
MONTH	16.0	3.5	26.0	13.0	24.5	13.5	28.0	15.0	22.0	13.5	21.0	12.0

04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI

LOCATION.--Lat 43°30'09", long 85°20'33", in SW¼ SW¼ sec.24, T.13 N., R.9 W., Mecosta County, Hydrologic Unit 04060102, on right bank at upstream side of highway bridge on 130th Avenue, 0.5 mi (0.8 km) downstream from Rustford Dam, and 5.2 mi (8.4 km) east of Morley.

DRAINAGE AREA.--138 mi² (357 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 920 ft (280 m) from topographic map.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Some regulation from dams above station.

AVERAGE DISCHARGE.--11 years, 127 ft³/s (3.597 m³/s), 12.50 in/yr (318 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,010 ft³/s (28.6 m³/s) Aug. 31, 1975, gage height, 5.92 ft (1.804 m); minimum, 31 ft³/s (0.88 m³/s) June 3, 1972; minimum gage height, 1.59 ft (0.485 m) June 3, 1972, May 22, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 393 ft³/s (11.1 m³/s) Mar. 13, gage height, 3.39 ft (1.033 m), no peak above base of 400 ft³/s (11.3 m³/s); minimum, 34 ft³/s (0.96 m³/s) May 22, gage height, 1.59 ft (0.485 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	75	105	105	76	88	105	197	93	69	53	39	69
2	75	99	105	77	88	105	187	91	71	49	37	83
3	75	99	110	78	89	103	183	91	65	47	41	91
4	71	97	115	78	89	135	175	87	61	51	39	91
5	73	97	115	78	89	225	231	99	63	57	63	89
6	91	95	110	78	89	187	211	99	79	55	79	85
7	101	95	110	78	90	147	181	89	77	63	65	81
8	89	93	110	78	92	161	159	87	71	67	71	77
9	89	91	105	79	98	235	129	85	73	59	65	73
10	103	95	105	79	105	321	115	83	65	51	95	69
11	101	93	105	80	105	315	113	81	67	51	81	67
12	97	89	105	80	105	349	109	81	69	49	71	63
13	95	89	105	82	105	387	111	77	69	47	65	65
14	93	91	105	83	100	369	109	75	65	47	67	63
15	91	89	105	84	94	305	105	73	61	45	63	61
16	89	89	105	84	94	247	105	71	59	45	63	67
17	91	89	100	85	98	209	109	71	57	45	67	69
18	95	93	100	85	100	185	109	79	55	47	63	115
19	95	95	98	85	105	167	107	81	51	63	57	185
20	97	95	94	85	105	173	109	77	51	51	57	165
21	95	95	90	85	110	169	121	73	55	49	55	139
22	97	93	90	85	115	165	125	65	55	45	63	107
23	95	91	90	86	120	159	119	69	53	43	61	97
24	95	91	90	86	130	145	109	67	51	45	65	107
25	99	93	90	85	150	139	111	63	53	47	63	167
26	97	105	88	84	120	135	105	59	49	45	59	157
27	95	125	86	80	115	135	101	57	49	43	57	141
28	93	121	84	83	110	159	99	55	47	43	59	125
29	93	115	82	84	---	259	97	53	49	47	93	115
30	93	110	79	86	---	249	95	49	51	47	85	117
31	105	---	74	87	---	237	---	57	---	45	71	---
TOTAL	2843	2917	3055	2543	2898	6381	3936	2337	1810	1541	1979	3000
MEAN	91.7	97.2	98.5	82.0	104	206	131	75.4	60.3	49.7	63.8	100
MAX	105	125	115	87	150	387	231	99	79	67	95	185
MIN	71	89	74	76	88	103	95	49	47	43	37	61
CFSM	.66	.70	.71	.59	.75	1.49	.95	.55	.44	.36	.46	.73
IN.	.77	.79	.82	.69	.78	1.72	1.06	.63	.49	.42	.53	.81

CAL YR 1976 TOTAL 63342 MEAN 173 MAX 712 MIN 65 CFSM 1.25 IN 17.07
WTR YR 1977 TOTAL 35240 MEAN 96.5 MAX 387 MIN 37 CFSM .70 IN 9.50

04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1966 to current year.

INSTRUMENTATION.--Temperature recorder since November 1966.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 28.0°C Aug. 23, 1968, June 28, 1971; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 26.0°C June 17, July 4; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	14.5	10.5	6.0	4.0	[illegible].5	0.0	0.5	0.0	0.0	0.0	2.0	0.5
2	15.0	11.5	6.5	5.0	0.5	0.0	0.0	0.0	0.0	0.0	2.0	0.5
3	16.0	12.5	6.0	4.5	0.5	0.5	0.0	0.0	0.0	0.0	2.0	2.0
4	15.5	12.5	5.0	4.5	0.5	0.0	0.0	0.0	0.0	0.0	2.0	1.5
5	14.5	13.0	4.5	3.5	0.5	0.0	0.0	0.0	0.0	0.0	2.0	1.5
6	13.0	10.5	5.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	1.5
7	11.0	9.0	4.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	5.0	2.0
8	10.0	7.5	2.5	1.0	0.5	0.0	0.0	0.0	0.0	0.0	5.0	2.5
9	9.5	7.5	3.0	1.5	0.5	0.0	0.0	0.0	0.0	0.0	5.0	3.0
10	9.0	8.5	3.0	2.5	0.5	0.0	0.0	0.0	0.0	0.0	4.0	2.0
11	10.5	8.5	2.5	1.0	0.5	0.0	0.0	0.0	0.0	0.0	4.5	2.5
12	13.0	9.5	1.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	4.5	4.0
13	12.0	10.5	2.5	1.0	0.5	0.0	0.0	0.0	0.0	0.0	4.5	4.5
14	10.5	8.0	2.5	1.0	0.5	0.0	0.0	0.0	0.0	0.0	6.0	4.5
15	10.0	8.5	1.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	8.5	5.5
16	9.0	7.5	2.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	8.5	5.5
17	7.5	6.0	2.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	5.5	3.5
18	6.5	5.0	3.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	2.5
19	6.5	5.5	3.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0	5.5	2.0
20	7.5	5.5	3.5	3.0	1.0	0.0	0.0	0.0	0.0	0.0	5.0	4.0
21	7.0	5.5	3.0	1.5	0.5	0.5	0.0	0.0	0.0	0.0	5.0	4.0
22	5.5	5.0	2.0	1.0	0.5	0.5	0.0	0.0	0.0	0.0	6.5	3.5
23	5.0	4.0	1.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0	5.5	4.0
24	6.0	5.0	1.0	1.0	0.5	0.0	0.0	0.0	1.0	0.0	5.5	2.0
25	7.0	5.5	2.0	0.5	0.5	0.0	0.0	0.0	1.0	0.5	6.5	3.0
26	6.5	5.0	4.5	2.0	0.0	0.0	0.0	0.0	1.0	0.5	8.5	4.0
27	5.5	3.5	4.0	2.5	0.5	0.0	0.0	0.0	2.0	0.5	9.0	6.0
28	5.0	2.5	2.5	0.5	0.5	0.5	0.0	0.0	3.0	0.5	9.0	8.5
29	6.5	4.0	0.5	0.5	0.5	0.5	0.0	0.0	---	---	11.0	8.0
30	6.5	6.0	0.5	0.5	0.5	0.5	0.0	0.0	---	---	10.5	8.5
31	7.5	6.0	---	---	0.5	0.5	0.0	0.0	---	---	10.5	6.5
MONTH	16.0	2.5	6.5	0.5	1.0	0.0	0.5	0.0	3.0	0.0	11.0	0.5

04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	6.5	5.0	15.5	11.0	16.5	14.5	21.5	17.0	16.5	11.5	20.5	18.5
2	6.5	5.5	18.5	13.0	19.0	12.5	24.5	16.5	13.5	10.5	18.5	17.0
3	9.0	5.5	17.0	11.5	20.0	12.5	21.5	18.5	15.5	9.0	19.5	15.0
4	7.5	5.5	15.0	12.5	20.5	14.0	26.0	19.5	15.0	11.0	20.5	15.5
5	5.5	4.0	18.5	13.5	21.5	17.0	25.5	22.0	14.5	11.5	19.5	17.5
6	5.0	2.5	18.5	14.0	19.5	14.5	25.5	20.5	13.5	12.0	19.0	14.5
7	6.5	3.0	17.5	12.0	16.5	12.0	22.5	19.5	14.0	11.0	20.0	16.5
8	7.5	3.5	16.0	11.0	15.5	13.0	22.5	17.0	14.0	11.5	20.5	16.5
9	9.5	4.0	15.5	9.5	19.0	11.5	22.5	16.5	20.5	11.0	20.5	16.5
10	13.0	7.0	16.5	10.0	19.0	13.5	20.5	15.5	24.0	18.0	17.5	15.0
11	16.0	10.5	17.5	10.5	16.5	15.0	20.0	15.0	20.0	16.5	17.0	12.5
12	16.5	12.0	17.5	12.5	15.5	14.5	21.0	16.0	21.0	14.5	15.5	14.0
13	16.0	12.5	20.5	13.5	17.5	13.0	22.5	15.5	21.0	15.5	14.5	14.0
14	15.5	10.5	21.0	15.0	21.0	15.0	21.5	14.5	21.5	16.5	17.5	12.0
15	13.5	10.5	21.0	14.5	23.0	16.0	25.0	17.5	21.0	14.5	14.5	12.5
16	13.5	10.0	22.0	16.0	23.0	17.5	23.0	18.0	19.5	17.5	15.5	13.0
17	15.0	11.5	21.0	17.0	26.0	19.5	24.0	17.5	20.5	16.0	15.5	14.0
18	17.5	12.5	23.5	17.5	25.5	21.0	21.5	17.5	19.5	14.0	16.5	15.0
19	16.0	13.5	23.5	17.0	24.5	18.5	23.0	16.0	16.0	13.5	16.5	16.0
20	15.5	13.5	24.0	18.0	21.5	18.5	24.0	18.0	17.5	12.5	16.0	14.0
21	15.5	14.0	23.5	18.5	22.5	16.0	22.0	18.0	17.5	14.5	14.0	13.5
22	15.0	13.5	22.5	18.0	23.5	16.0	21.0	14.0	20.0	13.5	14.0	13.5
23	16.5	11.5	22.5	18.0	22.5	17.5	19.5	13.5	18.0	15.0	13.5	13.5
24	14.5	10.5	23.0	18.0	23.5	19.0	16.5	13.5	18.0	13.0	14.0	13.5
25	11.5	9.5	24.5	18.5	25.5	20.0	18.5	13.0	19.0	12.5	15.5	13.0
26	14.0	8.0	23.5	17.5	25.5	18.0	17.5	10.5	19.5	15.0	16.5	14.5
27	15.5	9.5	23.5	16.5	25.5	19.5	17.5	9.5	23.5	18.5	15.0	14.0
28	14.5	10.5	23.5	16.5	23.5	20.5	14.5	10.5	24.0	20.5	15.5	13.5
29	15.0	8.5	22.0	17.0	24.5	19.0	14.5	12.0	21.5	18.5	14.0	12.5
30	15.5	9.5	21.5	15.5	21.5	18.5	17.0	11.0	21.0	16.5	13.5	13.0
31	---	---	18.5	15.5	---	---	17.5	13.0	21.5	16.5	---	---
MONTH	17.5	2.5	24.5	9.5	26.0	11.5	26.0	9.5	24.0	9.0	20.5	12.0

04122000 MUSKEGON RIVER AT NEWAYGO, MI

LOCATION.--Lat 43°25'20", long 85°48'04", in NE¼ NE¼ sec.24, T.12 N., R.13 W., Newaygo County, Hydrologic Unit 04060102, on left bank near nonoperative powerplant at Newaygo, 600 ft (183 m) downstream from Penoyer Creek and at mile 39.1 (62.9 km).

DRAINAGE AREA.--2,350 mi² (6,090 km²), approximately.

PERIOD OF RECORD.--July to December 1908, July 1909 to July 1915, January 1916 to December 1919, October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307. Records for June 1901 to December 1906, published in WSP 129, 170, and 206, have been found to be unreliable and should not be used.

REVISED RECORDS.--WSP 974: 1933, 1935, 1937-38. WSP 1307: 1940(M). See also PERIOD OF RECORD.

GAGE.--Water-stage recorder. Datum of gage is 625.83 ft (190.753 m) above mean sea level. October 1930 to January 1939, nonrecording gage, and Jan. 31, 1939, to Sept. 30, 1963, water-stage recorder at present site at datum 40.0 ft (12.192 m) lower.

REMARKS.--Records good except those for the winter period and those for the period of no gage-height record, Mar. 17 to Apr. 26, which are fair. Flow regulated by powerplants above station, the largest of which are at Croton Dam, Hardy Dam (since 1931), and Rogers Dam. Since Dec. 27, 1965, powerplant at Newaygo nonoperative, and in January 1969, dam at Newaygo was removed. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--55 years (water years 1910-14, 1917-19, 1931-77), 1,958 ft³/s (55.45 m³/s), 11.31 in/yr (287 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 14,950 ft³/s (423 m³/s) Mar. 25, 1913; minimum, 52 ft³/s (1.47 m³/s) Oct. 2, 1965, gage height, 5.31 ft (1.618 m), result of regulation during pipeline repair; minimum daily, 330 ft³/s (9.35 m³/s) Feb. 15, 1914.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,170 ft³/s (146 m³/s) Mar. 13, gage height, 9.78 ft (2.981 m); maximum gage height, 11.13 ft (3.392 m) Jan. 16, backwater from ice; minimum discharge, 586 ft³/s (16.6 m³/s) June 29, 30, gage height, 6.27 ft (1.911 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1110	1230	1350	1300	1850	1840	3500	1050	1050	685	1050	1240
2	1110	1150	1250	1300	1830	1850	3000	1050	1040	676	915	1170
3	1120	1700	1200	1300	1830	1850	3200	1050	1040	684	665	1300
4	1110	1700	1080	1520	1820	2000	3900	1050	1030	679	671	1300
5	1120	1400	1080	1890	1830	2470	3900	1060	1030	833	835	1290
6	1510	1150	1090	1790	1850	2540	3800	1050	1040	1020	1070	2020
7	1690	1100	1090	1780	1850	1880	3700	1050	1030	1030	1060	2770
8	1390	1100	1080	1790	1830	1880	3200	1040	1030	1020	1060	2350
9	1380	1100	1080	1900	1830	2130	3000	1040	1030	1020	1060	2280
10	1380	1300	1090	1800	1830	2720	2100	1040	1030	1020	1060	2190
11	1300	1850	1090	1770	1840	3250	2000	1050	1050	1020	1060	2090
12	1150	1800	1080	1430	1850	4040	2000	1050	1040	1030	932	1940
13	1100	1200	1200	1300	1860	5100	1850	1050	1030	1020	1060	1410
14	1100	1100	1320	1300	1840	5130	1500	1050	1030	1020	1050	1120
15	1100	1100	1320	1250	1850	4780	1500	1050	1030	946	1050	1020
16	1100	1100	1320	1200	1850	4360	1500	1060	1040	670	1060	1020
17	1100	1100	1540	1300	1750	4500	1500	1080	1060	669	1060	1020
18	1200	1100	1610	1600	1620	4600	1950	1070	1060	689	1060	1120
19	1300	1250	1220	1900	1330	4500	2050	1060	1060	674	1060	1610
20	1280	1400	1080	2150	1330	4600	2100	1060	1060	667	1050	2280
21	1320	1350	1100	2200	1340	4500	2000	1070	1060	661	1050	2030
22	1720	1300	1170	2200	1550	4300	1600	1070	1050	656	1050	1350
23	1480	1360	1310	2200	1840	3500	1500	1050	1050	655	892	1240
24	1430	1360	1310	2200	2280	2700	1500	1040	1050	657	663	1350
25	1110	1360	1320	2200	2380	1600	1800	1040	1050	651	663	2220
26	1100	1360	1320	2040	1260	1200	1750	1040	1060	645	831	1990
27	1100	1370	1340	1910	1130	1200	1670	1040	1060	648	1060	1750
28	1100	1420	1310	1880	1430	1300	1220	1030	1070	795	1070	1450
29	1100	1840	1300	1900	---	3500	1050	1040	917	1060	1070	1290
30	1260	1780	1300	1900	---	3800	1050	1030	619	1050	1060	1250
31	1370	---	1300	1900	---	3700	---	1050	---	1050	1050	---
TOTAL	38740	40430	38250	54100	48680	97320	66390	32560	30796	25600	30347	48460
MEAN	1250	1348	1234	1745	1739	3139	2213	1050	1027	826	979	1615
MAX	1720	1850	1610	2200	2380	5130	3900	1080	1070	1060	1070	2770
MIN	1100	1100	1080	1200	1130	1200	1050	1030	619	645	663	1020
CFSM	.53	.57	.53	.74	.74	1.34	.94	.45	.44	.35	.42	.69
IN.	.61	.64	.61	.86	.77	1.54	1.05	.52	.49	.41	.48	.77

CAL YR 1976 TOTAL 988811 MEAN 2702 MAX 10700 MIN 95, CFSM 1.15 IN 15.65
WTR YR 1977 TOTAL 551673 MEAN 1511 MAX 5130 MIN 619 CFSM .64 IN 8.73

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°19'05", long 86°02'11", in SW¼ NW¼ sec.30, T.11 N., R.14 W., Newago County, Hydrologic Unit 04060102, at bridge on Maple Island Road, 5 mi (8 km) southwest of Bridgeton, 13 mi (21 km) upstream from Muskegon Lake, and 20 mi (32 km) downstream from gaging station at Newago.

DRAINAGE AREA.--2,420 mi² (6,270 km²), approximately.

PERIOD OF RECORD.--Water years 1974 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to current year.
WATER TEMPERATURES: November 1974 to current year.

INSTRUMENTATION.--Water quality monitor since Nov. 12, 1975.

REMARKS.--Interruptions in the daily record were due to malfunctions of the instrument. Monthly samples are collected as a cross section sample at the bridge. Water discharge measurements are made at times of monthly sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded, 637 micromhos Feb. 15, 1977; minimum (water years 1975 and 1976), 108 micromhos Apr. 16, 1976.
WATER TEMPERATURES: Maximum, 33.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 33.0°C July 19; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UM-MF (COL./ 100 ML)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)
OCT												
06...	1000	1070	371	7.9	14.0	10.0	98	2700	370	--	180	16
NOV												
11...	1000	--	400	8.0	5.0	13.2	99	74	B7	B25	190	26
DEC												
09...	1200	--	380	8.1	.0	14.3	102	470	B7	54	--	--
JAN												
12...	1200	--	450	7.7	.0	14.0	109	170	B6	E11	200	28
FEB												
09...	1330	E1930	437	8.0	.0	15.0	105	110	B4	95	--	--
MAR												
08...	1200	1870	425	7.9	3.0	12.5	95	320	B3	B51	190	26
APR												
05...	1515	3300	351	7.7	5.0	11.5	93	B130	B18	B1100	160	29
MAY												
03...	1330	1010	359	7.8	16.0	10.2	104	1000	B9	B19	170	42
JUN												
07...	1130	1020	362	8.3	18.0	9.8	104	6500	27	B36	160	21
JUL												
12...	1130	990	361	8.2	24.5	8.4	100	B450	31	34	170	31
AUG												
02...	1210	999	368	8.4	21.0	8.6	97	B9400	96	38	180	29
SEP												
13...	1145	1470	411	8.3	17.5	8.6	91	B9400	180	B86	180	26

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
OCT												
06...	48	15	11	.4	1.0	200	0	164	4.0	21	21	.1
NOV												
11...	49	16	12	.4	1.0	200	0	164	3.2	21	22	.1
DEC												
09...	--	--	--	--	--	200	0	164	2.5	25	24	.1
JAN												
12...	51	17	12	.4	1.0	210	0	172	6.7	22	22	.1
FEB												
09...	--	--	--	--	--	220	0	180	3.5	22	24	.1
MAR												
08...	52	15	13	.4	1.5	200	0	164	4.0	24	27	.1
APR												
05...	42	13	11	.4	1.5	160	0	131	5.1	24	22	.1
MAY												
03...	48	13	11	.4	1.7	160	0	130	4.1	28	20	.1
JUN												
07...	44	13	11	.4	1.4	170	0	139	1.4	28	20	.1
JUL												
12...	45	14	12	.4	1.3	170	0	139	1.7	28	21	.1
AUG												
02...	47	14	12	.4	1.5	180	2	151	1.2	25	22	.1
SEP												
13...	48	15	13	.4	1.4	188	0	154	1.5	23	25	.2

E--ESTIMATED VALUE
B--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	SUS-PENDED SEDI-MENT (MG/L)	SUS-PENDED SEDI-MENT DIS-CHARGE (T/DAY)	SUS. SED. SIEVE DIAM. % FINER THAN .062 MM
OCT											
06...	4.5	216	220	624	.10	.33	1.5	.05	6	17	100
NOV											
11...	3.2	223	223	--	.13	.33	1.5	.02	10	--	100
DEC											
09...	3.2	251	--	--	.32	.62	2.7	.03	36	--	100
JAN											
12...	4.8	235	233	--	.26	.51	2.3	.02	1	--	100
FEB											
09...	6.3	245	--	--	.41	.62	2.7	.03	8	E42	100
MAR											
08...	6.7	254	238	1280	.56	.88	3.9	.03	10	50	100
APR											
05...	6.5	224	199	2000	.56	1.1	4.7	.03	38	339	100
MAY											
03...	4.7	225	205	614	.21	.75	3.3	.04	14	38	100
JUN											
07...	4.5	236	206	650	.17	.50	2.2	.03	15	41	100
JUL											
12...	4.2	237	201	633	.15	.92	4.1	.01	6	16	100
AUG											
02...	4.1	252	216	680	.01	.46	2.0	.02	7	19	100
SEP											
13...	5.3	234	224	929	.09	.61	2.7	.04	24	95	100

DATE	TIME	TOTAL ARSENIC (AS) (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	TOTAL CAD-MIUM (CD) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	TOTAL CHRO-MIUM (CR) (UG/L)	DIS-SOLVED CHRO-MIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	TOTAL IRON (FE) (UG/L)
OCT												
06...	1000	1	1	1	0	<10	<10	0	0	0	0	120
JAN												
12...	1200	2	1	1	1	<10	<10	0	0	10	0	70
APR												
05...	1515	1	1	1	1	10	<10	0	0	10	0	330
JUL												
12...	1130	2	2	3	0	20	0	0	0	2	0	240

DATE	DIS-SOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	TOTAL MAN-GANESE (MN) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	TOTAL MERCURY (MG) (UG/L)	DIS-SOLVED MERCURY (MG) (UG/L)	TOTAL SELE-NIUM (SE) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	TOTAL ZINC (ZN) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	TOTAL ORGANIC CARBON (C) (MG/L)
OCT												
06...	20	13	3	30	10	<.5	<.5	0	0	10	10	4.3
JAN												
12...	20	6	6	20	10	<.5	<.5	0	0	20	20	4.4
APR												
05...	70	8	1	30	10	<.5	<.5	1	0	20	10	8.1
JUL												
12...	20	60	2	50	0	.0	.0	0	0	10	0	8.1

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
PERIPHYTON

DATE	LENGTH OF EXPOSURE (DAYS)	BIOMASS CHLOROPHYLL RATIO PERIPHYTON (UNITS)	PERIPHYTON BIOMASS ASH WEIGHT G/SQ M	PERIPHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)	CHLOR-B PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)
JUL						
07...	35	1507	3.23	4.33	.730	.287
AUG						
06...	21	15150	70.4	80.7	.678	.307

IDENTIFICATION OF PHYTOPLANKTON

DATE	OCT 6,76	NOV 11,76	DEC 9,76	JAN 12,77	FEB 9,77
TIME	1000	1000	1200	1200	1330
TOTAL CELLS/ML	560	2000	140	77	190
DIVERSITY: DIVISION	0.8	0.5	1.0	1.0	0.9
.CLASS	0.8	0.5	1.0	1.7	0.9
..ORDER	1.5	1.2	1.5	1.7	1.1
...FAMILY	2.8	1.7	3.1	2.9	2.6
....GENUS	3.1	1.8	3.3	2.9	2.9

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	3	4	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	*	0	--	-	3	4	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....FRANCEIA	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	*	0	--	-	11	8	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	48	2	7	5	12#	15	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	-
..ULOTRICHALES										
...ULOTRICHACEAE										
....ULOTHRIX	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	4	1	17	1	2	2	--	-	--	-
...PHACOTACEAE										
....PHACOTUS	--	-	--	-	2	2	--	-	--	-
...VOLVOCACEAE										
....GONIUM	--	-	--	-	--	-	--	-	--	-
....PANDORINA	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	--	-	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	4	3	--	-	--	-
...ZYGNEMATACEAE										
....MOUGEOTIA	--	-	--	-	31#	23	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE / TIME	OCT 6,76 1000		NOV 11,76 1000		DEC 9,76 1200		JAN 12,77 1200		FEB 9,77 1330	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	26	5	--	-	--	-	--	-	4	2
....MELOSIRA	110#	19	1500#	72	--	-	--	-	--	-
....STEPHANODISCUS	--	-	31	2	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	2	2	--	-	4	2
....COCCONEIS	48	9	28	1	4	3	--	-	4	2
....RHOICOSPHENIA	--	-	--	-	--	-	3	4	--	-
...CYMBELLACEAE										
....AMPHORA	4	1	14	1	--	-	--	-	4	2
....CYMBELLA	18	3	10	1	2	2	3	4	8	4
....EPITHEMIA	--	-	*	0	9	6	--	-	--	-
...DIATOMACEAE										
....DIATOMA	9	2	170	9	24#	18	18#	23	39#	21
....OPEPHORA	--	-	*	0	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	55	3	--	-	--	-	8	4
....FRAGILARIA	13	2	10	1	--	-	--	-	8	4
....SYNEDRA	--	-	--	-	2	2	--	-	16	9
...GOMPHONEMATACEAE										
....GOMPHONEMA	18	3	*	0	2	2	--	-	8	4
...NAVICULACEAE										
....DIPLONEIS	--	-	*	0	--	-	--	-	--	-
....NAVICULA	180#	32	52	3	27#	19	9	12	12	6
....PINNULARIA	--	-	--	-	--	-	--	-	--	-
....STAURONEIS	--	-	--	-	2	2	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	31	6	35	2	4	3	6	8	4	2
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	*	0	--	-	--	-	--	-
....OCHROMONAS	--	-	--	-	--	-	18#	23	--	-
.BACILLARIOPHYCEAE										
..PENNALES										
...NAVICULACEAE										
....PLAGIOTROPIS	4	1	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCOCCALES										
...CHROCOCCACEAE										
....ANACYSTIS	*	0	17	1	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	35	6	--	-	--	-	--	-	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....OSCILLATORIA	53	9	55	3	--	-	--	-	67#	36
..CHROCOCCALES										
...CHROCOCCACEAE										
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	9	2	--	-	--	-	3	4	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....PHACUS	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...CERATIACEAE										
....CERATIUM	--	-	--	-	--	-	--	-	--	-
...GLENODINIACEAE										
....GLENODINIUM	--	-	*	0	--	-	--	-	--	-
...PERIDINIACEAE										
....PERIDINIUM	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	MAY 3,77	JUN 7,77	JUL 12,77	AUG 2,77	SEP 13,77
TIME	1330	1130	1130	1210	1145
TOTAL CELLS/ML	4800	970	2300	2500	3400
DIVERSITY: DIVISION	1.6	0.6	1.6	1.7	1.9
.CLASS	1.7	0.9	1.7	1.7	2.1
..ORDER	2.4	1.3	2.2	2.6	2.4
...FAMILY	3.4	2.7	3.3	3.4	2.8
....GENUS	3.7	3.3	3.6	3.8	2.9

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	24	1	19	1	19	1
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	95	4	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	360	7	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	360	7	--	-	12	1	37	1	--	-
....DICTYOSPHAERIUM	--	-	36	4	140	6	150	6	--	-
....FRANCEIA	--	-	--	-	--	-	*	0	--	-
....KIRCHNERIELLA	27	1	--	-	12	1	37	1	--	-
....OOCYSTIS	--	-	--	-	48	2	37	1	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	*	0
....TETRAEDRON	27	1	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	9	1	48	2	--	-	--	-
....SCENEDESMUS	110	2	71	7	700#	31	390#	16	260	8
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	36	2	19	1	--	-
..ULOTRICHALES										
...ULOTRICHACEAE										
....ULOTHRIX	--	-	--	-	--	-	--	-	65	2
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	--	-	24	1	93	4	19	1
....CHLAMYDOMONAS	27	1	9	1	83	4	37	1	--	-
...PHACOTACEAE										
....PHACOTUS	--	-	--	-	36	2	--	-	--	-
...VOLVOCACEAE										
....GONIUM	110	2	--	-	--	-	--	-	--	-
....PANDORINA	--	-	--	-	--	-	150	6	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	--	-	--	-	--	-	*	0	--	-
....COSMARIUM	--	-	--	-	--	-	--	-	--	-
...ZYGNEMATACEAE										
....MOUGEOTIA	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE / TIME	MAY 3,77 1330		JUN 7,77 1130		JUL 12,77 1130		AUG 2,77 1210		SEP 13,77 1145	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	740#	15	45	5	71	3	--	-	28	1
....MELOSIRA	630	13	45	5	--	-	93	4	850#	25
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	27	1	--	-	12	1	--	-	19	1
....COCCONEIS	55	1	36	4	12	1	19	1	19	1
....RHOICOSPHENIA	--	-	--	-	--	-	*	0	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	160#	17	--	-	37	1	*	0
....CYMBELLA	250	5	230#	24	--	-	19	1	--	-
....EPITHEMIA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	360	7	130	13	--	-	19	1	28	1
....OPEPHORA	--	-	--	-	--	-	--	-	28	1
...FRAGILARIACEAE										
....ASTERIONELLA	82	2	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	9	1	200	9	37	1	47	1
....SYNEDRA	--	-	9	1	--	-	240	10	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....DIPLONEIS	--	-	9	1	--	-	--	-	--	-
....NAVICULA	82	2	120	12	48	2	93	4	37	1
....PINNULARIA	--	-	--	-	36	2	--	-	--	-
....STAURONEIS	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	520	11	--	-	150	7	--	-	*	0
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	140	3	63	6	48	2	--	-	--	-
....OCHROMONAS	--	-	--	-	--	-	--	-	180	5
.BACILLARIOPHYCEAE										
..PENNALES										
...NAVICULACEAE										
....PLAGIOTROPIS	--	-	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....ANACYSTIS	--	-	--	-	95	4	600#	24	*	0
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	47	2	--	-
....APHANIZOMENON	--	-	--	-	--	-	120	5	75	2
...OSCILLATORIACEAE										
....OSCILLATORIA	550	11	--	-	--	-	130	5	1300#	39
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	*	0
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	250	5	--	-	240	11	--	-	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	110	2	--	-	71	3	19	1	100	3
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....PHACUS	--	-	--	-	--	-	--	-	37	1
....TRACHELOMONAS	--	-	--	-	--	-	--	-	*	0
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...CERATIACEAE										
....CERATIUM	--	-	--	-	--	-	*	0	220	7
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	--	-	--	-	*	0
...PERIDINIACEAE										
....PERIDINIUM	--	-	--	-	--	-	19	1	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	426	380	417	401	326	374	382	334	367			
2	424	377	415	392	365	378	400	355	387			
3	421	403	411	404	375	390	411	373	399			
4	423	376	410	403	381	392	408	380	398			
5	423	391	405	399	370	386	402	342	388			
6	392	370	373	408	371	396	420	376	414			
7	403	375	383	410	388	403	398	374	385			
8	407	391	401	409	377	397	401	364	386			
9	414	374	401	410	390	400	429	356	402			
10	414	397	406	414	386	397	407	235	329			
11	414	376	405	409	385	396	414	352	396			
12	419	379	403	408	385	399	409	352	380			
13	424	402	413	412	386	401	429	402	414			
14	420	375	408	405	389	400	435	315	379			
15	420	364	395	412	392	402	407	300	346			
16	422	389	413	411	392	401	402	348	378			
17	418	384	411	404	357	380	407	383	397			
18	417	390	409	410	354	375	429	371	408			
19	416	353	384	418	398	409	427	398	408			
20	404	393	398	408	391	401	425	390	400			
21	400	391	395	413	390	402	---	---	---			
22	405	387	396	405	384	394	---	---	---			
23	409	375	401	405	383	393	---	---	---			
24	411	334	371	413	395	403	---	---	---			
25	398	379	389	414	375	397	---	---	---			
26	405	366	391	385	296	324	---	---	---			
27	406	385	399	362	243	285	---	---	---			
28	411	391	402	394	350	373	---	---	---			
29	416	381	397	384	360	373	---	---	---			
30	415	326	398	389	361	378	---	---	---			
31	390	320	351	---	---	---	---	---	---			
MONTH	426	320	398	418	243	387	435	235	388			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	571	451	523	---	---	---	350	340	345
2	---	---	---	566	419	487	---	---	---	356	338	346
3	---	---	---	487	345	410	---	---	---	360	341	350
4	---	---	---	346	321	335	---	---	---	361	341	352
5	---	---	---	400	336	353	---	---	---	---	---	---
6	---	---	---	417	388	402	351	320	338	---	---	---
7	---	---	---	489	391	427	352	322	337	359	336	349
8	---	---	---	485	381	417	350	317	332	371	338	356
9	---	---	---	438	381	396	360	317	331	364	349	355
10	583	440	501	470	387	427	353	323	334	364	342	351
11	527	463	480	496	430	465	356	332	346	369	342	353
12	543	458	493	494	317	372	356	336	348	348	342	345
13	505	452	479	369	347	362	356	328	341	362	341	348
14	608	504	549	376	360	367	360	339	351	364	341	350
15	637	572	613	422	336	375	360	338	351	365	341	354
16	629	582	618	475	407	436	371	341	357	360	341	353
17	619	528	591	475	457	467	380	356	368	358	340	353
18	589	500	543	466	331	412	374	346	359	358	340	350
19	585	498	552	473	342	413	375	337	353	361	347	355
20	605	515	570	469	364	432	358	330	340	362	343	354
21	611	552	592	453	380	434	356	324	341	361	337	352
22	598	504	549	410	376	383	349	309	333	355	324	344
23	530	357	409	411	356	388	368	341	359	354	326	344
24	427	353	375	411	375	393	369	350	358	355	326	347
25	484	427	443	412	392	403	358	336	349	367	354	361
26	533	448	498	423	406	415	358	334	350	366	354	359
27	545	487	531	420	411	417	353	321	336	361	351	357
28	565	458	515	---	---	---	348	323	336	358	351	355
29	---	---	---	---	---	---	363	335	351	355	344	352
30	---	---	---	---	---	---	366	342	351	367	342	355
31	---	---	---	---	---	---	---	---	---	---	---	---
MONTH	637	353	521	571	317	412	380	309	346	371	324	352

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	---	---	---	374	362	365	396	384	390
2	331	272	291	---	---	---	376	357	366	388	356	377
3	348	284	318	---	---	---	---	---	---	396	380	387
4	357	341	350	---	---	---	---	---	---	400	386	390
5	356	320	348	---	---	---	---	---	---	408	394	399
6	353	283	325	363	337	352	---	---	---	410	384	394
7	356	333	345	---	---	---	364	334	351	415	388	402
8	362	350	355	---	---	---	366	351	358	416	387	401
9	362	347	355	354	326	340	368	334	360	414	397	408
10	364	347	354	354	348	352	366	345	360	420	404	413
11	---	---	---	356	344	349	365	360	363	421	401	412
12	---	---	---	363	348	354	373	355	366	437	340	414
13	---	---	---	355	339	350	373	353	364	387	349	374
14	---	---	---	360	340	351	371	358	365	391	381	386
15	361	343	352	367	349	358	378	357	368	397	322	373
16	366	348	356	---	---	---	381	342	364	---	---	---
17	366	348	358	---	---	---	376	365	370	---	---	---
18	357	341	350	---	---	---	387	368	373	---	---	---
19	353	341	347	---	---	---	388	366	376	---	---	---
20	356	340	348	---	---	---	383	368	378	---	---	---
21	360	336	351	---	---	---	384	376	380	---	---	---
22	355	339	349	---	---	---	384	362	380	---	---	---
23	353	341	347	---	---	---	385	367	377	---	---	---
24	359	341	350	---	---	---	---	---	---	---	---	---
25	358	345	350	---	---	---	---	---	---	---	---	---
26	354	338	347	---	---	---	---	---	---	---	---	---
27	353	337	347	---	---	---	---	---	---	---	---	---
28	---	---	---	---	---	---	---	---	---	---	---	---
29	---	---	---	---	---	---	---	---	---	---	---	---
30	---	---	---	---	---	---	380	371	375	---	---	---
31	---	---	---	380	354	369	395	383	391	---	---	---
MONTH	366	272	345	380	326	353	395	334	369	437	322	395

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	17.0	13.5	15.5	7.5	6.5	7.0	1.0	0.0	0.5	0.0	0.0	0.0
2	17.5	13.5	16.0	8.0	6.5	7.0	0.5	0.0	0.0	0.0	0.0	0.0
3	18.0	15.5	17.0	6.5	5.5	6.0	0.0	0.0	0.0	0.0	0.0	0.0
4	18.0	16.0	17.0	7.0	5.5	6.5	0.0	0.0	0.0	0.0	0.0	0.0
5	17.0	14.5	16.0	7.0	6.0	6.5	0.0	0.0	0.0	0.0	0.0	0.0
6	14.5	13.5	13.5	7.0	6.0	6.5	0.0	0.0	0.0	0.0	0.0	0.0
7	15.0	13.5	14.0	6.5	4.5	6.0	0.0	0.0	0.0	0.0	0.0	0.0
8	13.5	12.0	13.0	5.0	3.5	4.5	0.0	0.0	0.0	0.0	0.0	0.0
9	13.0	12.5	12.5	5.5	3.5	4.5	0.0	0.0	0.0	0.0	0.0	0.0
10	13.0	12.0	12.5	5.0	4.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0
11	13.5	11.5	12.5	5.0	4.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0
12	14.5	12.5	12.5	4.5	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0
13	14.0	11.5	13.5	4.0	3.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0
14	12.0	11.0	11.0	4.5	3.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0
15	12.0	10.0	11.0	4.0	2.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
16	11.0	9.5	10.5	4.0	2.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
17	10.0	9.0	9.5	4.5	3.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0
18	9.5	8.5	9.0	4.5	3.5	4.0	0.0	0.0	0.0	0.0	0.0	0.0
19	9.5	9.0	9.0	5.0	4.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0
20	10.0	8.5	9.5	4.0	3.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0
21	9.5	8.0	9.0	4.0	2.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0
22	8.0	7.0	7.5	3.0	1.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
23	8.0	7.0	7.0	2.0	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0
24	9.0	7.0	8.5	2.5	1.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0
25	9.5	8.5	9.0	3.0	2.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0
26	9.0	7.5	8.0	5.5	4.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0
27	7.5	6.0	6.5	5.0	3.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0
28	7.5	5.5	6.5	3.0	0.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0
29	7.5	6.0	6.5	1.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
30	8.5	7.0	8.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	9.5	7.0	8.5	---	---	---	0.0	0.0	0.0	0.0	0.0	0.0
MONTH	18.0	5.5	11.0	8.0	0.0	4.0	1.0	0.0	0.0	0.0	0.0	0.0

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	0.0	0.0	0.0	1.0	0.0	0.5	6.5	5.0	5.5	15.0	12.5	13.5
2	0.0	0.0	0.0	1.5	0.0	0.5	6.5	5.0	5.5	17.5	13.0	15.0
3	0.0	0.0	0.0	1.5	1.0	1.5	7.0	5.5	6.0	16.5	13.0	15.0
4	0.0	0.0	0.0	1.5	1.0	1.0	7.0	4.0	5.0	16.0	14.5	15.0
5	0.0	0.0	0.0	1.5	1.0	1.0	5.0	4.0	4.5	18.0	13.0	15.0
6	0.0	0.0	0.0	1.5	1.0	1.5	5.0	4.0	5.0	18.5	15.0	16.5
7	0.0	0.0	0.0	3.5	1.0	2.0	6.0	4.0	5.0	17.5	14.5	16.0
8	0.5	0.0	0.5	3.0	2.0	2.5	5.5	4.0	5.0	16.5	13.5	15.0
9	0.0	0.0	0.0	4.0	2.0	3.0	6.0	4.5	5.5	16.0	12.5	14.0
10	0.5	0.0	0.5	4.0	1.5	3.0	8.5	6.0	7.0	17.0	13.0	14.5
11	0.5	0.0	0.5	4.5	2.5	3.5	10.5	8.5	9.5	17.5	13.5	15.5
12	0.5	0.5	0.5	4.5	2.0	3.0	11.0	9.5	10.5	17.5	14.5	16.0
13	0.5	0.5	0.5	4.0	2.5	3.0	11.0	10.5	11.0	19.0	14.5	17.0
14	0.5	0.0	0.5	3.5	2.0	3.0	12.5	10.5	11.0	20.5	17.0	18.5
15	0.0	0.0	0.0	4.5	2.0	3.0	11.5	10.0	11.0	21.0	17.0	19.0
16	0.0	0.0	0.0	4.5	3.5	3.5	13.0	10.0	11.5	21.5	18.0	19.5
17	0.0	0.0	0.0	4.0	2.0	3.0	14.5	12.5	13.5	21.0	19.0	19.5
18	0.5	0.0	0.0	3.5	1.0	2.0	15.0	12.5	14.0	23.0	18.5	20.0
19	0.0	0.0	0.0	3.5	1.0	2.5	14.5	12.0	13.5	23.5	19.0	21.5
20	0.0	0.0	0.0	4.0	2.0	3.0	13.0	12.0	12.5	23.5	20.0	22.0
21	0.0	0.0	0.0	3.5	2.5	3.5	13.5	12.5	13.0	23.5	20.0	21.5
22	0.0	0.0	0.0	4.0	2.5	3.5	13.0	11.5	12.0	23.0	20.5	21.5
23	1.0	0.5	0.5	4.5	3.0	3.5	16.0	12.0	14.0	23.0	19.5	21.0
24	2.0	1.0	1.5	4.0	2.0	3.5	14.5	12.0	13.5	23.5	19.5	21.5
25	1.5	1.0	1.0	5.0	4.0	4.5	12.5	11.0	11.5	24.5	20.5	22.5
26	1.5	0.5	1.0	7.5	4.5	6.0	13.0	10.5	12.0	24.0	20.5	22.0
27	1.5	0.5	1.0	7.5	5.5	6.5	13.5	12.0	13.0	24.0	20.5	22.0
28	2.0	0.5	1.0	6.5	5.5	6.0	13.0	11.0	12.5	24.0	20.5	22.0
29	---	---	---	7.5	5.5	6.5	14.0	10.0	12.0	23.0	20.0	21.5
30	---	---	---	7.5	5.0	6.5	15.0	11.0	13.0	22.5	19.0	20.5
31	---	---	---	7.0	6.0	6.5	---	---	---	21.0	18.0	19.0
MONTH	2.0	0.0	0.5	7.5	0.0	3.5	16.0	4.0	10.0	24.5	12.5	18.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	18.0	16.0	17.0	21.5	17.0	19.5	24.0	21.5	22.5	22.0	20.0	21.0
2	19.0	15.0	17.0	23.5	18.5	21.0	22.0	20.0	21.5	20.5	20.0	20.0
3	20.5	16.5	18.5	22.5	19.0	20.5	24.0	14.0	19.5	21.5	19.5	20.5
4	21.0	18.0	19.0	24.5	19.0	21.5	25.0	17.0	21.0	22.0	20.0	21.0
5	21.0	19.0	20.0	28.0	22.5	25.0	23.5	19.0	21.0	21.5	20.0	21.0
6	19.5	18.0	19.0	28.0	24.0	26.0	22.5	20.5	21.5	21.0	19.0	20.0
7	18.5	16.0	17.5	24.5	23.0	23.5	22.5	20.5	21.5	21.0	20.0	20.5
8	17.5	16.0	17.0	26.5	22.0	24.0	23.0	21.0	22.0	21.0	20.0	20.5
9	19.0	14.5	16.5	26.5	23.5	24.5	22.0	19.5	21.5	21.0	20.0	20.5
10	19.0	16.5	18.0	25.0	22.5	24.0	23.0	19.5	21.5	20.0	18.0	19.0
11	18.0	15.5	16.5	25.5	22.5	24.0	22.0	19.0	20.5	19.5	18.5	19.0
12	16.0	15.0	15.5	26.0	23.5	24.5	21.0	17.5	19.5	19.5	17.5	19.0
13	17.5	14.5	16.0	25.5	22.5	24.0	22.5	13.0	19.5	18.5	18.0	18.5
14	20.5	17.0	18.5	26.0	22.5	24.0	22.5	19.5	20.5	19.5	14.5	17.5
15	22.5	18.0	20.0	28.0	24.0	25.5	23.0	19.0	20.5	18.0	16.5	17.0
16	22.5	19.0	20.5	29.5	23.0	25.5	22.5	19.0	21.0	18.5	15.0	16.5
17	23.5	19.5	21.5	31.5	21.0	24.5	21.5	19.0	20.5	19.0	17.5	18.5
18	23.5	21.0	22.0	26.0	21.0	22.5	20.5	18.0	19.0	20.0	18.0	19.0
19	23.0	19.5	21.0	33.0	20.5	25.0	19.0	17.5	18.5	19.0	17.5	18.5
20	22.0	19.5	20.5	31.0	21.5	25.0	20.0	17.0	18.5	17.5	17.0	17.0
21	22.0	18.0	20.0	29.0	18.0	22.5	19.5	18.5	19.0	17.0	16.5	17.0
22	23.0	19.0	21.0	28.5	13.0	19.5	20.5	18.0	19.0	17.5	16.5	17.0
23	22.0	19.5	20.5	30.5	18.5	23.5	19.5	17.5	19.0	17.0	16.5	17.0
24	23.5	20.0	21.5	25.0	18.5	22.5	---	---	---	17.5	16.5	16.0
25	24.0	21.0	22.5	27.5	16.0	22.0	---	---	---	17.5	16.0	16.5
26	24.0	20.0	22.5	26.5	12.0	18.0	24.0	13.5	19.5	18.0	17.5	17.5
27	24.0	21.0	22.5	24.0	11.0	17.5	23.0	18.0	20.5	18.0	17.5	17.5
28	22.0	20.0	21.0	26.5	13.5	19.5	23.5	20.0	21.5	18.5	17.5	18.0
29	23.0	19.0	21.0	21.5	18.5	20.0	23.0	20.5	21.5	17.5	16.5	17.0
30	21.0	18.5	19.5	24.0	20.0	21.5	22.0	19.5	21.0	17.0	15.5	16.5
31	---	---	---	25.5	22.5	24.0	23.5	20.0	22.0	---	---	---
MONTH	24.0	14.5	19.5	33.0	11.0	22.5	25.0	13.0	20.5	22.0	14.5	18.5

04122100 BEAR CREEK NEAR MUSKEGON, MI

LOCATION.--Lat 43°17'19", long 86°13'22", in SW¼ NW¼ sec.4, T.10 N., R.16 W., Muskegon County, Hydrologic Unit 04060102, on left bank at upstream side of bridge on North Getty Street, 1.5 mi (2.4 km) upstream from Little Bear Creek, and 3.9 mi (6.3 km) northeast of Muskegon.

DRAINAGE AREA.--14.8 mi² (38.3 km²).

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Datum of gage is 595.80 ft (181.600 m) above mean sea level.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation during low flow, from dams and irrigation above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--12 years, 15.5 ft³/s (0.439 m³/s), 14.22 in/yr (361 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,200 ft³/s (34.0 m³/s), Mar. 5, 1976, gage height, 11.00 ft (3.353 m); minimum, 1.0 ft³/s (0.028 m³/s) Aug. 5, 17, 22, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 102 ft³/s (2.89 m³/s) Mar. 13, gage height, 6.69 ft (2.039 m), only peak above base of 100 ft³/s (2.83 m³/s); minimum, 1.3 ft³/s (0.037 m³/s) Oct. 4; minimum gage height, 3.58 ft (1.091 m) on several days during June, July, August, and September.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.7	4.9	5.2	5.4	6.3	8.6	23	11	6.6	4.5	2.4	3.5
2	2.2	4.5	5.3	5.6	6.4	8.4	24	11	5.9	3.6	2.7	4.9
3	2.2	4.3	5.4	5.8	6.5	8.0	24	9.5	4.9	4.2	3.3	4.3
4	2.0	5.1	5.5	5.8	6.5	15	22	9.3	4.3	8.3	2.9	3.2
5	3.0	5.5	5.5	6.0	6.6	19	34	13	5.0	5.1	5.8	3.3
6	6.9	5.1	5.5	6.1	6.6	14	30	12	6.8	3.5	5.6	3.0
7	4.7	4.6	5.4	6.2	6.6	14	25	9.8	5.3	4.2	4.3	2.7
8	3.9	4.5	5.4	6.3	6.6	21	21	9.2	4.8	3.0	4.3	2.5
9	3.8	4.5	5.5	6.4	6.5	46	19	8.3	4.6	3.1	3.8	2.5
10	3.6	4.4	5.8	6.4	6.6	66	18	8.6	4.3	2.9	5.1	2.2
11	3.3	4.5	5.6	6.4	6.7	66	17	7.8	6.4	2.8	3.8	2.2
12	3.5	4.6	5.3	6.5	6.9	79	16	7.6	6.1	2.8	3.3	2.4
13	3.4	4.6	5.0	6.5	7.0	77	15	7.5	5.5	2.8	3.6	3.3
14	3.4	4.4	5.4	6.6	6.8	46	14	6.8	4.6	2.8	5.6	3.0
15	3.4	4.0	5.3	6.6	6.6	34	14	6.6	3.8	2.8	3.4	2.6
16	3.7	4.2	5.0	6.6	6.9	26	13	6.2	3.6	2.8	3.4	3.8
17	3.8	4.6	4.6	6.6	7.2	23	13	5.8	3.7	3.1	3.5	3.7
18	3.9	4.8	4.3	6.6	7.4	24	12	6.0	4.0	6.2	2.7	9.9
19	3.7	4.5	4.1	6.5	6.6	24	12	5.5	3.6	5.8	2.7	8.7
20	4.0	4.2	4.3	6.5	6.1	30	17	5.1	3.1	3.5	2.8	6.1
21	4.3	4.4	4.4	6.4	6.0	32	19	5.1	3.1	3.0	2.8	5.0
22	4.2	4.2	4.5	6.4	6.3	31	26	5.2	2.8	3.1	3.2	4.7
23	4.0	4.0	4.5	6.3	7.0	25	20	4.4	2.6	2.8	2.8	4.5
24	4.6	4.1	4.6	6.2	12	21	16	4.3	3.0	2.7	3.2	17
25	5.0	4.5	4.6	6.0	13	20	19	4.0	3.6	3.0	2.5	13
26	4.3	5.9	4.7	5.6	11	19	17	3.8	3.0	2.6	2.5	12
27	3.9	7.3	4.7	5.0	10	18	15	3.4	2.6	2.6	2.5	8.0
28	4.0	5.6	4.7	5.4	9.4	23	13	3.3	3.4	2.6	2.6	6.6
29	4.1	4.8	4.6	5.7	---	57	11	3.5	4.3	5.1	5.4	5.8
30	4.5	5.0	4.5	6.0	---	43	11	3.3	4.4	3.7	3.3	6.5
31	6.7	---	5.1	6.2	---	27	---	5.0	---	2.8	2.7	---
TOTAL	120.7	141.6	154.3	190.6	208.1	965.0	550	211.9	129.7	111.8	108.5	160.9
MEAN	3.89	4.72	4.98	6.15	7.43	31.1	18.3	6.84	4.32	3.61	3.50	5.36
MAX	6.9	7.3	5.8	6.6	13	79	34	13	6.8	8.3	5.8	17
MIN	2.0	4.0	4.1	5.0	6.0	8.0	11	3.3	2.6	2.6	2.4	2.2
CFSM	.26	.32	.34	.42	.50	2.10	1.24	.46	.29	.24	.24	.36
IN.	.30	.36	.39	.48	.52	2.43	1.38	.53	.33	.28	.27	.40

CAL YR 1976 TOTAL 8296.1 MEAN 22.7 MAX 720 MIN 2.0 CFSM 1.53 IN 20.85
WTR YR 1977 TOTAL 3053.1 MEAN 8.36 MAX 79 MIN 2.0 CFSM .57 IN 7.67

04122200 WHITE RIVER NEAR WHITEHALL, MI

LOCATION.--Lat 43°27'51", long 86°13'57", in SE¼ NW¼ sec.4, T.12 N., R.16 W., Muskegon County, Hydrologic Unit 04060101, on right bank 30 ft (9 m) downstream from bridge on Fruitvale Road, 6.3 mi (10.1 km) downstream from North Branch, and 6.9 mi (11.1 km) northeast of Whitehall.

DRAINAGE AREA.--380 mi² (980 km²), approximately.

PERIOD OF RECORD.--August 1957 to current year.

GAGE.--Water-stage recorder. Datum of gage is 594.1 ft (181.1 m) above mean sea level, unadjusted. Nov. 18, 1957, to Oct. 22, 1958, nonrecording gage at same site and datum.

REMARKS.--Record good except those for the winter period, which are fair. Some regulation during low flows from dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years, 419 ft³/s (11.87 m³/s), 14.97 in/yr (380 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,400 ft³/s (153 m³/s) Sept. 1, 1975, gage height, 7.46 ft (2.274 m); minimum, 163 ft³/s (4.62 m³/s) Aug. 18, 19, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,440 ft³/s (40.8 m³/s) Mar. 13, gage height, 5.37 ft (1.637 m); minimum, 226 ft³/s (6.40 m³/s) July 17, gage height, 1.56 ft (0.475 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	331	367	375	315	350	440	669	379	276	260	247	248
2	326	364	385	330	350	430	650	374	280	252	236	271
3	322	358	390	340	355	510	649	368	286	250	233	335
4	322	355	395	345	355	588	711	360	278	266	235	343
5	325	350	400	350	360	662	667	360	276	261	264	306
6	352	348	395	350	360	659	685	367	288	252	303	279
7	386	344	390	350	360	584	659	359	296	267	296	268
8	387	340	375	350	360	531	591	347	282	281	295	261
9	379	339	360	345	360	542	541	339	282	274	307	254
10	370	340	350	330	360	626	502	333	279	257	299	248
11	360	341	350	340	365	804	478	329	283	246	294	244
12	354	341	350	350	370	965	457	326	293	241	285	243
13	349	341	335	350	370	1300	441	322	297	238	273	248
14	343	340	330	350	375	1390	427	317	291	233	275	252
15	338	337	335	350	380	1180	414	311	280	232	269	250
16	340	332	340	350	370	1060	403	305	271	228	361	253
17	332	333	350	350	345	932	396	299	266	232	269	260
18	330	343	350	350	360	814	393	292	261	248	261	277
19	330	350	340	350	380	716	388	294	256	283	251	337
20	331	348	340	350	370	651	391	296	252	276	247	424
21	324	344	315	350	360	625	410	296	251	259	245	484
22	338	342	300	350	350	608	441	287	248	248	247	451
23	341	339	320	350	380	583	470	283	245	238	246	410
24	345	336	340	350	415	552	456	282	245	234	247	407
25	350	336	350	350	430	512	441	275	248	238	244	430
26	350	340	350	350	450	485	474	266	244	237	241	489
27	345	353	340	340	440	472	489	271	239	232	245	468
28	338	361	320	325	440	480	456	268	243	229	244	431
29	335	350	305	330	---	548	417	265	261	236	255	388
30	337	360	280	340	---	709	389	262	259	256	264	365
31	352	---	295	345	---	756	---	267	---	253	254	---
TOTAL	10662	10372	10750	10675	10520	21714	14955	9699	8056	7737	8232	9924
MEAN	344	346	347	344	376	700	499	313	269	250	266	331
MAX	387	367	400	350	450	1390	711	379	297	283	361	489
MIN	322	332	280	315	345	430	388	262	239	228	233	243
CFSM	.91	.91	.91	.91	.99	1.84	1.31	.82	.71	.66	.70	.87
IN.	1.04	1.02	1.05	1.05	1.03	2.13	1.46	.95	.79	.76	.81	.97

CAL YR 1976 TOTAL 211333 MEAN 577 MAX 4180 MIN 280 CFSM 1.52 IN 20.69
WTR YR 1977 TOTAL 133296 MEAN 365 MAX 1390 MIN 228 CFSM .96 IN 13.05

04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI

LOCATION.--Lat 43°56'42", long 86°16'43", in NW¼ NW¼ sec.19, T.18 N., R.16 W., Mason County, Hydrologic Unit 04060101, on right bank 20 ft (6 m) upstream from highway bridge at south edge of Scottville, 1.4 mi (2.3 km) upstream from India Creek and 5.6 mi (9.0 km) downstream from Big South Branch.

DRAINAGE AREA.--709 mi² (1,836 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1939 to current year. Prior to October 1942, published as "at Custer".

REVISED RECORDS.--WSP 1437: 1941(M), 1943(M), 1949(M), 1950.

GAGE.--Water-stage recorder. Datum of gage is 597.66 ft (182.167 m) above mean sea level. Prior to June 12, 1943, nonrecording gage at bridge 4.5 mi (7.2 km) upstream at different datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Some regulation above station during low flow.

AVERAGE DISCHARGE.--38 years, 652 ft³/s (18.46 m³/s), 12.49 in/yr (317 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,970 ft³/s (84.1 m³/s) July 1, 1969, gage height, 6.26 ft (1.908 m); minimum, 209 ft³/s (5.92 m³/s) Dec. 11, 1962, discharge measurement; minimum daily, 310 ft³/s (8.78 m³/s) Aug. 9, 10, 1941.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,740 ft³/s (77.6 m³/s) Mar. 15, gage height, 5.39 ft (1.643 m); minimum daily, 381 ft³/s (10.8 m³/s) July 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	540	572	590	450	620	1050	1380	714	491	427	390	422
2	530	578	600	480	640	1200	1310	700	515	420	383	420
3	520	556	600	510	640	1400	1300	683	521	420	385	449
4	515	551	590	540	640	1350	1420	669	506	430	383	506
5	504	543	600	550	640	1210	1610	662	494	446	415	491
6	530	537	610	550	650	1000	1600	658	497	435	455	467
7	549	528	600	550	650	910	1480	655	503	476	464	446
8	569	524	580	540	660	855	1380	637	503	491	485	427
9	556	520	560	530	660	900	1290	623	497	494	479	425
10	542	517	540	530	660	1020	1190	617	494	455	518	412
11	539	519	540	530	660	1210	1110	608	506	427	476	405
12	539	516	530	540	660	1660	1040	602	515	412	452	400
13	537	508	530	540	670	2310	980	596	518	402	437	412
14	536	493	520	560	680	2530	925	590	509	397	449	417
15	533	486	520	580	680	2720	870	581	491	390	446	415
16	536	483	510	580	660	2590	815	572	473	383	458	417
17	538	477	510	590	640	2270	788	563	464	381	485	422
18	539	488	510	590	660	1990	772	566	452	390	494	446
19	540	499	510	600	680	1730	756	572	443	407	455	536
20	539	503	500	600	680	1540	749	578	437	427	427	648
21	542	513	470	610	690	1420	756	563	435	437	420	746
22	546	511	450	610	700	1350	805	548	432	415	432	728
23	548	508	460	610	710	1290	820	536	425	397	435	648
24	557	503	480	610	750	1200	830	533	422	388	435	627
25	552	502	500	620	800	1130	825	524	425	402	425	651
26	543	509	520	620	860	1050	840	515	422	402	417	690
27	539	530	500	580	900	1020	860	512	412	392	410	718
28	542	547	470	540	980	1050	830	503	407	383	410	679
29	536	570	450	550	---	1140	780	497	417	383	440	651
30	539	580	420	580	---	1260	739	488	425	390	443	623
31	574	---	430	600	---	1370	---	485	---	405	440	---
TOTAL	16749	15671	16200	17470	19520	44755	30850	18150	14051	12904	13643	15744
MEAN	540	522	523	564	697	1444	1028	585	468	416	440	525
MAX	574	580	610	620	980	2720	1610	714	521	494	518	746
MIN	504	477	420	450	620	855	739	485	407	381	383	400
CFSM	.76	.74	.74	.80	.98	2.04	1.45	.83	.66	.59	.62	.74
IN.	.88	.82	.85	.92	1.02	2.35	1.62	.95	.74	.68	.72	.83

CAL YR 1976 TOTAL 303878 MEAN 830 MAX 2820 MIN 420 CFSM 1.17 IN 15.94
WTR YR 1977 TOTAL 235707 MEAN 646 MAX 2720 MIN 381 CFSM .91 IN 12.37

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: May 1968 to current year.

INSTRUMENTATION.--Temperature recorder since May 1968.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 25.0°C July 20, 21, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 25.0°C July 20, 21; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	11.0	10.5	6.5	6.0	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0
2	12.0	11.0	6.5	6.0	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0
3	12.0	11.5	6.5	6.0	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0
4	13.0	12.0	6.0	5.5	1.0	1.0	0.0	0.0	0.0	0.0	0.5	0.0
5	13.0	12.0	5.5	5.5	1.0	1.0	0.0	0.0	0.0	0.0	0.5	0.0
6	12.0	11.0	6.0	6.0	1.0	1.0	0.0	0.0	0.0	0.0	0.5	0.5
7	10.5	9.5	6.0	6.0	1.0	1.0	0.0	0.0	0.0	0.0	2.0	0.5
8	9.5	9.0	5.5	4.5	1.0	1.0	0.0	0.0	0.0	0.0	2.5	2.0
9	9.0	8.5	5.0	4.5	1.0	1.0	0.0	0.0	0.0	0.0	3.0	2.5
10	8.5	8.0	5.0	5.0	1.0	1.0	0.0	0.0	0.0	0.0	3.0	2.5
11	8.5	8.0	5.0	4.5	1.0	1.0	0.0	0.0	0.0	0.0	2.5	1.5
12	10.0	8.5	4.5	4.0	1.0	1.0	0.0	0.0	0.0	0.0	1.5	0.5
13	10.0	10.0	4.0	3.5	1.0	1.0	0.0	0.0	0.0	0.0	1.0	0.5
14	10.0	8.5	4.0	4.0	0.5	0.5	0.0	0.0	0.0	0.0	2.5	1.0
15	8.5	8.5	4.0	3.5	0.5	0.5	0.0	0.0	0.0	0.0	5.5	2.5
16	8.5	8.0	3.5	3.0	0.5	0.5	0.0	0.0	0.0	0.0	6.0	5.5
17	8.0	7.0	3.5	3.0	0.5	0.5	0.0	0.0	0.0	0.0	6.0	5.5
18	7.0	6.5	4.5	3.5	0.5	0.5	0.0	0.0	0.0	0.0	5.5	4.5
19	6.5	6.0	4.0	4.5	0.5	0.5	0.0	0.0	0.0	0.0	4.5	3.0
20	6.0	6.0	4.5	4.0	0.5	0.5	0.0	0.0	0.0	0.0	4.0	4.0
21	6.5	6.0	4.5	4.5	0.5	0.5	0.0	0.0	0.0	0.0	4.5	3.5
22	6.5	5.5	4.5	4.0	0.5	0.5	0.0	0.0	0.0	0.0	5.0	4.0
23	5.5	5.5	4.0	3.5	0.5	0.5	0.0	0.0	0.0	0.0	5.0	4.5
24	5.5	5.5	3.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0	5.0	3.0
25	6.0	5.5	3.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	5.0	3.0
26	6.0	6.0	4.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	6.5	4.5
27	6.0	5.0	4.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	6.5	6.0
28	5.0	4.0	3.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0	7.5	6.5
29	5.0	4.5	2.0	2.0	0.0	0.0	0.0	0.0	---	---	10.0	7.5
30	6.5	5.5	2.0	2.0	0.0	0.0	0.0	0.0	---	---	10.0	9.5
31	6.5	6.5	---	---	0.0	0.0	0.0	0.0	---	---	10.0	7.5
MONTH	13.0	4.0	6.5	2.0	1.5	0.0	0.0	0.0	0.0	0.0	10.0	0.0

04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	7.5	6.0	14.0	13.0	17.5	15.5	18.0	17.0	21.0	19.5	19.0	18.5
2	6.0	6.0	15.5	13.5	16.0	14.0	19.0	16.0	21.0	19.0	18.5	17.0
3	7.0	5.0	16.0	13.5	16.5	14.5	19.0	17.5	19.0	18.0	17.0	16.0
4	7.0	5.5	17.0	15.0	16.5	15.0	21.0	18.0	18.5	18.0	17.0	16.0
5	5.5	4.5	18.5	16.5	18.0	16.5	23.0	20.0	19.5	18.5	17.0	17.0
6	5.5	4.0	18.5	16.5	18.0	17.0	24.0	22.5	20.0	19.0	17.0	15.5
7	6.5	5.0	17.5	15.0	17.5	15.0	24.0	22.5	20.0	19.5	16.0	16.0
8	6.5	5.0	16.0	14.0	16.5	15.5	23.0	21.0	19.5	19.0	17.0	16.0
9	7.5	5.0	15.0	13.0	16.0	13.5	23.0	21.0	19.5	18.5	18.0	17.0
10	11.0	7.5	15.0	12.5	16.0	14.0	22.0	19.5	18.5	18.5	18.0	16.0
11	13.5	10.5	16.0	13.0	14.5	14.0	21.5	19.5	18.5	18.0	16.0	14.5
12	15.0	13.0	16.0	14.5	14.0	14.0	22.5	21.0	18.5	16.5	15.0	15.0
13	15.0	14.5	18.5	15.5	15.0	13.5	22.5	21.0	18.5	17.5	15.0	14.5
14	15.0	13.0	20.0	17.5	16.5	14.0	22.5	20.0	17.5	16.5	14.5	13.5
15	15.0	12.5	20.5	18.5	18.0	15.5	23.0	22.0	18.0	16.5	14.0	13.0
16	14.0	12.0	21.5	19.5	18.5	17.0	23.5	22.0	18.0	17.5	13.5	13.0
17	14.0	13.0	21.5	20.5	20.5	18.0	23.5	22.5	17.5	16.5	13.5	13.5
18	15.5	14.0	22.0	20.5	21.0	20.0	23.5	22.5	17.5	15.5	15.0	13.5
19	15.5	15.0	22.0	20.0	21.0	19.0	24.0	21.5	17.0	15.0	15.0	15.0
20	15.5	15.0	22.0	20.5	20.5	18.5	25.0	23.5	15.5	14.0	15.0	14.0
21	15.0	15.0	22.5	20.5	18.5	16.5	25.0	23.5	15.0	14.5	14.0	13.5
22	15.0	13.5	22.5	21.5	18.5	16.5	24.0	21.0	15.5	14.0	13.5	13.5
23	15.5	13.0	22.0	20.0	18.5	17.0	22.5	20.5	15.5	15.0	13.5	13.5
24	16.0	14.0	21.5	20.0	19.0	18.0	21.0	19.5	15.0	14.0	13.0	13.0
25	15.0	13.0	21.5	20.0	20.5	18.5	20.5	19.0	15.0	13.5	13.5	13.0
26	14.0	11.5	21.5	20.0	20.5	18.5	20.5	18.0	15.5	14.5	13.5	13.0
27	14.5	11.5	21.0	19.0	21.5	19.5	19.0	17.0	19.0	15.5	13.5	13.5
28	14.5	12.0	21.0	19.0	21.5	20.0	19.0	17.5	19.5	19.0	13.5	13.0
29	13.5	11.0	20.5	19.0	20.5	19.0	19.0	18.5	19.5	18.5	13.0	12.0
30	14.0	11.5	20.5	18.5	20.5	18.5	20.0	18.5	19.0	17.0	12.5	12.5
31	---	---	19.5	17.5	---	---	21.0	20.0	19.0	17.5	---	---
MONTH	16.0	4.0	22.5	12.5	21.5	13.5	25.0	16.0	21.0	13.5	19.0	12.0

04123500 MANISTEE RIVER NEAR GRAYLING, MI

LOCATION.--Lat 44°41'35", long 84°50'50", in SW¼ NW¼ sec.31, T.27 N., R.4 W., Crawford County, Hydrologic Unit 04060103, at partial-record streamflow station, on right bank 25 ft (8 m) upstream from bridge on State Highway 72, 3.3 mi (5.3 km) downstream from Goose Creek, and 6.8 mi (10.9 km) northwest of Grayling.

DRAINAGE AREA.--159 mi² (412 km²).

PERIOD OF RECORD.--Water years 1957 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: May 1957 to October 1976.

INSTRUMENTATION.--Temperature recorder since May 1957.

REMARKS.--Interruptions in the record were due to malfunctions of the recorder.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum recorded, 25.0°C July 6, 7, 1977; minimum (water years 1957-76), 0.0°C on many days during winter periods.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	11.5	9.0	5.5	3.5	1.5	1.5					---	---
2	12.0	9.5	4.5	4.0	1.5	1.5					---	---
3	12.0	10.0	4.5	4.0	1.5	1.5					---	---
4	12.0	10.0	4.0	4.0	1.5	1.5					---	---
5	12.0	10.5	4.0	4.0	1.5	1.5					---	---
6	10.0	8.5	4.0	3.5	1.5	1.5					---	---
7	8.5	7.0	3.5	3.0	1.5	1.5					---	---
8	8.5	7.0	3.0	2.0	1.5	1.5					---	---
9	8.5	7.0	3.0	2.0	1.5	1.5					---	---
10	7.0	7.0	3.0	3.0	---	---					---	---
11	9.5	7.0	3.0	2.5	---	---					---	---
12	10.0	8.5	3.0	2.5	---	---					---	---
13	10.0	9.0	3.5	3.0	---	---					---	---
14	9.0	6.5	3.5	3.0	---	---					---	---
15	7.0	7.0	3.0	2.0	---	---					---	---
16	7.0	6.5	2.5	2.0	---	---					---	---
17	6.0	5.0	2.5	2.5	---	---					---	---
18	5.0	5.0	3.5	2.5	---	---					---	---
19	5.0	5.0	3.0	3.0	---	---					---	---
20	5.5	5.0	3.0	3.0	---	---					---	---
21	5.5	5.0	3.0	3.0	---	---					---	---
22	5.0	4.0	3.0	2.0	---	---					---	---
23	4.5	4.0	2.0	2.0	---	---					---	---
24	4.5	4.5	2.0	2.0	---	---					---	---
25	5.0	4.5	2.5	2.0	---	---					2.5	1.5
26	5.0	4.5	3.5	2.5	---	---					5.5	2.5
27	4.5	4.0	3.5	3.0	---	---					5.5	4.5
28	4.0	3.5	3.0	1.5	---	---					5.5	4.5
29	5.0	4.0	1.5	1.5	---	---					8.0	5.5
30	5.5	5.0	1.5	1.5	---	---					8.0	5.5
31	5.5	5.5	---	---	---	---					6.5	5.0
MONTH	12.0	3.5	5.5	1.5	1.5	1.5					8.0	1.5

04123500 MANISTEE RIVER NEAR GRAYLING, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	5.5	3.5	13.5	11.0	13.5	12.5	14.5	13.5	19.5	16.5	17.5	16.5
2	3.5	3.5	15.0	11.5	15.5	11.5	18.5	12.5	18.0	14.0	16.5	13.0
3	6.5	4.0	13.5	10.0	16.5	11.5	18.5	14.5	16.5	13.0	15.5	12.5
4	6.5	4.0	14.5	11.0	16.5	13.0	22.0	15.5	---	---	---	---
5	4.0	3.5	14.5	12.5	16.0	14.0	24.0	19.0	---	---	---	---
6	4.5	4.0	15.0	12.0	16.5	13.5	25.0	20.0	---	---	---	---
7	4.5	4.0	14.0	10.0	15.5	11.5	25.0	19.5	---	---	---	---
8	6.5	3.0	12.5	10.0	16.5	12.5	21.0	17.0	---	---	---	---
9	8.5	4.5	13.0	9.0	16.5	11.0	21.0	17.0	---	---	---	---
10	11.5	7.0	14.0	9.5	17.0	12.0	20.5	15.5	---	---	---	---
11	13.0	9.5	15.0	10.0	17.0	13.5	21.0	16.0	---	---	---	---
12	13.0	11.0	14.0	11.5	13.5	12.5	21.5	18.0	---	---	---	---
13	13.0	10.5	17.5	12.5	15.5	11.5	21.5	18.0	---	---	---	---
14	11.5	7.5	17.0	13.0	18.5	12.5	21.0	16.0	---	---	---	---
15	11.5	8.5	17.5	12.5	18.5	14.0	22.5	18.5	---	---	---	---
16	11.5	8.5	18.0	14.0	18.5	15.5	22.0	17.5	---	---	---	---
17	12.5	10.0	19.0	14.5	20.5	15.5	23.5	19.5	---	---	---	---
18	13.0	11.5	19.0	15.0	19.5	17.0	23.5	19.0	---	---	---	---
19	13.0	11.0	19.0	15.0	18.5	15.0	23.5	17.0	---	---	---	---
20	13.0	12.0	20.5	15.5	16.0	14.5	24.5	20.5	14.0	11.5	---	---
21	12.5	11.5	20.5	16.5	18.5	13.5	24.0	20.0	14.0	13.0	12.5	11.5
22	13.0	11.0	20.5	16.5	18.5	13.5	21.0	16.0	15.5	12.5	11.5	11.5
23	13.0	10.0	19.5	16.0	18.5	14.5	21.5	16.5	15.5	13.5	11.5	11.0
24	13.0	9.5	20.5	15.5	19.0	15.5	19.5	16.0	14.5	11.5	11.0	10.5
25	11.5	8.5	20.5	16.0	21.0	16.5	18.5	15.5	15.0	11.5	12.0	10.5
26	12.0	8.5	20.0	15.0	20.5	15.0	18.0	14.0	15.0	13.5	12.0	11.0
27	13.0	9.0	20.0	15.0	21.0	17.0	18.0	13.5	19.0	15.5	11.0	10.0
28	13.0	9.5	20.5	15.0	21.0	18.0	18.0	14.5	20.0	19.0	10.0	8.5
29	12.5	8.5	17.5	14.5	20.0	16.0	17.0	15.0	20.0	17.0	8.5	7.0
30	13.5	10.0	17.5	13.5	16.5	14.0	19.0	15.0	17.0	14.0	7.0	7.0
31	---	---	17.5	13.5	---	---	19.0	16.5	18.0	15.0	---	---
MONTH	13.5	3.0	20.5	9.0	21.0	11.0	25.0	12.5	20.0	11.5	17.5	7.0

04124000 MANISTEE RIVER NEAR SHERMAN, MI

LOCATION.--Lat 44°26'11", long 85°41'55", in NE¼ NE¼ sec.36, T.24 N., R.12 W., Wexford County, Hydrologic Unit 04060103, on downstream side of bridge near right pier on State Highway 37, 250 ft (76 m) upstream from Wheeler Creek, 0.9 mi (1.4 km) north of Sherman, and at mile 60.8 (97.8 km).

DRAINAGE AREA.--900 mi² (2,331 km²).

PERIOD OF RECORD.--July 1903 to May 1916, October 1930 to September 1931, October 1933 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1004: 1936(m). WSP 1307: 1911, 1913-14(M), 1934(M), 1936(M), 1937, 1939-40(M). WSP 1437: 1911, 1913(M), 1937.

GAGE.--Nonrecording gage. Altitude of gage is 804 ft (245 m) from river-profile map. Prior to Apr. 13, 1934, at various datums.

REMARKS.--Records poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--57 years (water years 1904-15, 1931, 1934-77), 1,057 ft³/s (29.93 m³/s), 15.95 in/yr (405 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,570 ft³/s (101 m³/s) Mar. 25, 1913, gage height, 7.1 ft (2.16 m), from graph based on gage readings, datum then in use; minimum daily, 540 ft³/s (15.3 m³/s) Feb. 21-23, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,280 ft³/s (64.6 m³/s) Mar. 15, gage height, 14.15 ft (4.313 m); minimum daily, 724 ft/s (20.5 m³/s) July 2.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	802	895	900	820	880	961	2160	1030	841	730	1060	850
2	799	898	900	840	880	946	2190	1030	841	724	1040	844
3	790	895	890	860	880	946	2100	1030	847	730	943	844
4	796	889	890	880	880	940	1940	1030	853	739	880	841
5	811	874	890	900	880	961	1860	1020	865	745	874	838
6	832	865	890	910	880	1000	1710	997	880	745	853	838
7	835	865	890	890	880	988	1650	976	895	754	850	847
8	832	865	890	860	880	982	1540	967	898	787	838	835
9	823	865	890	860	880	988	1480	961	895	805	841	832
10	817	865	890	860	880	1000	1440	961	874	775	841	829
11	805	862	890	860	880	1100	1400	958	853	757	838	820
12	793	862	890	860	880	1180	1380	952	850	751	838	814
13	793	862	890	860	880	1360	1360	943	850	748	835	805
14	796	853	890	860	870	2010	1350	940	844	748	835	802
15	805	853	890	860	860	2220	1340	937	832	745	832	799
16	820	856	880	870	850	2230	1320	934	823	742	829	811
17	829	856	880	870	835	2180	1320	916	820	742	832	808
18	832	856	880	870	862	2170	1290	910	820	745	844	835
19	838	853	868	870	940	2080	1260	904	820	745	847	865
20	835	856	862	870	943	1940	1240	895	820	751	850	877
21	847	859	850	870	943	1550	1220	880	817	760	844	892
22	850	862	850	870	955	1340	1210	880	817	814	832	904
23	862	862	850	870	985	1340	1180	877	817	814	832	925
24	862	865	841	880	1000	1360	1170	874	814	811	832	958
25	868	865	835	880	1020	1310	1160	871	814	811	832	982
26	868	868	820	880	1030	1250	1150	868	796	811	832	1020
27	871	880	820	880	1020	1230	1120	862	781	811	832	1050
28	871	895	820	880	1000	1250	1100	859	769	817	844	1030
29	886	900	814	890	---	1380	1040	850	757	820	856	988
30	892	900	811	890	---	1720	1030	847	739	823	862	964
31	895	---	811	890	---	1990	---	841	---	928	865	---
TOTAL	25855	26101	26862	27010	25553	43902	42710	28800	24942	24028	26663	26347
MEAN	834	870	867	871	913	1416	1424	929	831	775	860	878
MAX	895	900	900	910	1030	2230	2190	1030	898	928	1060	1050
MIN	790	853	811	820	835	948	1030	841	739	724	829	799
CFSM	.93	.97	.96	.97	1.01	1.57	1.58	1.03	.92	.86	.96	.98
IN.	1.07	1.08	1.11	1.12	1.06	1.81	1.77	1.19	1.03	.99	1.10	1.09

CAL YR 1976 TOTAL 414366 MEAN 1132 MAX 3360 MIN 790 CFSM 1.26 IN 17.13
WTR YR 1977 TOTAL 348773 MEAN 956 MAX 2230 MIN 724 CFSM 1.06 IN 14.42

04125500 PINE RIVER NEAR HOXEYVILLE, MI

LOCATION.--Lat 44°12'11", long 85°47'58", in SW¼ NW¼ sec.20, T.21 N., R.12 W., Wexford County, Hydrologic Unit 04060103, on right bank 500 ft (152 m) upstream from bridge on State Highway 37, 4.2 mi (6.8 km) northwest of Hoxeyville, 8.0 mi (12.9 km) east of Wellston, and 8.0 mi (12.9 km) upstream from mouth.

DRAINAGE AREA.--251 mi² (650 km²).

PERIOD OF RECORD.--July 1952 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 775 ft (236 m) by barometer.

REMARKS.--Records fair prior to May 19, good thereafter. Some regulation during low flows from dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 286 ft³/s (8.100 m³/s), 15.47 in/yr (393 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,440 ft³/s (69.1 m³/s) Aug. 6, 1956, gage height, 6.82 ft (2.079 m), from rating curve extended above 1,100 ft³/s (31.2 m³/s); minimum, 161 ft³/s (4.56 m³/s) Feb. 2, 1961.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 650 ft³/s (18.4 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 14	1400	*1,250	35.4	*3.83	1.167	Mar. 30	0200	728	20.6	3.18	0.969

Minimum discharge, 212 ft³/s (6.00 m³/s) July 17, 18, gage height, 1.76 ft (0.536 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	244	295	247	252	249	261	534	275	222	218	234	236
2	242	276	249	252	249	254	570	275	233	215	233	235
3	242	269	247	254	249	261	625	270	238	215	226	238
4	240	269	247	254	249	266	561	270	231	220	228	238
5	242	266	247	254	252	266	514	270	233	227	242	235
6	256	266	247	254	254	279	479	285	249	222	246	233
7	272	269	249	254	252	282	420	300	252	231	241	234
8	265	266	247	254	252	282	389	280	244	237	249	234
9	260	264	252	252	254	298	370	275	238	225	256	232
10	260	261	261	254	254	335	355	270	235	219	254	228
11	255	261	261	254	254	385	340	265	235	218	247	225
12	250	266	261	254	256	498	320	260	233	218	239	225
13	250	266	264	254	256	826	309	255	231	216	241	231
14	250	259	266	254	252	1180	295	250	227	216	247	231
15	255	252	261	254	252	943	287	250	227	216	252	231
16	260	247	252	254	264	840	305	245	227	214	260	231
17	259	252	252	254	274	647	330	245	227	214	294	232
18	256	254	252	254	271	506	320	240	224	216	275	242
19	256	256	254	256	271	448	314	250	224	229	249	282
20	261	252	252	256	271	406	309	240	227	224	237	310
21	266	252	252	256	271	369	314	239	224	231	233	280
22	269	256	252	256	271	347	317	234	227	225	241	263
23	271	254	252	256	271	332	323	237	227	221	267	262
24	271	256	252	254	271	312	314	235	227	217	259	279
25	274	252	252	254	274	306	310	229	227	218	252	316
26	276	252	254	254	266	303	300	222	224	218	239	337
27	269	252	247	252	264	320	290	221	224	217	234	306
28	264	252	249	252	266	376	285	220	222	216	235	285
29	261	252	252	252	---	557	280	222	218	217	246	281
30	261	247	252	252	---	680	275	222	218	219	248	280
31	287	---	252	252	---	570	---	222	---	247	242	---
TOTAL	8044	7791	7834	7868	7289	13935	10954	7773	6895	6856	7646	7672
MEAN	259	260	253	254	260	450	365	251	230	221	247	256
MAX	287	295	266	256	274	1180	625	300	252	247	294	337
MIN	240	247	247	252	249	254	275	220	218	214	226	225
CFSM	1.03	1.04	1.01	1.01	1.04	1.79	1.45	1.00	.92	.88	.98	1.02
IN.	1.19	1.15	1.16	1.17	1.08	2.07	1.62	1.15	1.02	1.02	1.13	1.14

CAL YR 1976 TOTAL 123229 MEAN 337 MAX 1300 MIN 240 CFSM 1.34 IN 18.26
WTR YR 1977 TOTAL 100557 MEAN 275 MAX 1180 MIN 214 CFSM 1.10 IN 14.90

04126000 MANISTEE RIVER NEAR MANISTEE, MI

LOCATION.--Lat 44°16'14", long 86°11'56", in NW¼ NW¼ sec.36, T.22 N., R.16 W., Manistee County, Hydrologic Unit 04060103, on right bank 6.4 mi (10.3 km) northeast of Manistee, 7.8 mi (12.6 km) upstream from Manistee Lake, and at mile 10.8 (17.4 km).

DRAINAGE AREA.--1,780 mi² (4,610 km²), approximately.

PERIOD OF RECORD.--October 1951 to current year. Monthly discharge only for October, November, 1951, published in WSP 1727.

GAGE.--Water-stage recorder. Altitude of gage is 585 ft (178 m) from river-profile map.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated at all stages by Tippy hydroelectric power-plant 21 mi (34 km) above station. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--26 years, 1,995 ft³/s (56.50 m³/s), 15.22 in/yr (387 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,120 ft³/s (202 m³/s) Mar. 30, 1976, gage height, 8.37 ft (2.551 m); maximum gage height, 9.15 ft (2.789 m) Feb. 12, 1955, backwater from ice; minimum daily discharge, 992 ft³/s (28.1 m³/s) Oct. 10, 1966.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,700 ft³/s (190 m³/s) Mar. 15, gage height, 8.30 ft (2.530 m); maximum gage height, 9.00 ft (2.743 m) Dec. 29, backwater from ice; minimum discharge, 722 ft³/s (20.4 m³/s) June 18, gage height, 3.53 ft (1.076 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1670	1730	1840	1100	1600	2000	3800	1470	1510	1580	1840	1600
2	1500	1870	1700	1100	1900	1950	3760	1820	1400	1320	1950	1630
3	1400	1920	1550	1900	1950	1700	3710	1970	1920	1180	1850	1690
4	1370	1720	1500	2100	2050	2150	3760	2290	1710	1130	1560	1420
5	1650	1900	1450	2200	1900	2500	3690	1930	1420	1240	1510	1350
6	1680	1790	1400	2000	1500	2600	3710	2160	1440	1500	1590	1450
7	1780	1490	1800	1850	1400	1980	3630	2040	1680	1570	1430	1560
8	1800	1680	2000	1900	1900	1860	3450	1480	1600	1590	1390	1680
9	1690	1640	1850	1700	2200	2140	3220	1710	1600	1460	1530	1630
10	1430	1710	1950	1600	2100	2320	2820	1860	1690	1140	1530	1660
11	1460	2020	1800	1700	1900	2190	2370	2020	1660	1020	1640	1280
12	1540	1890	1500	1700	1850	2850	2740	1940	1350	1720	1690	1330
13	1750	1660	1200	1600	1800	3130	2800	1860	1250	1240	1600	1520
14	1700	1530	1900	1500	2300	4360	2790	1620	1750	1170	1350	1500
15	1670	1360	1800	1400	1400	6230	2600	1540	1590	1440	1180	1440
16	1670	1940	1800	1350	1800	6180	2660	1500	1420	1360	1650	1580
17	1410	1610	1950	1450	1600	5160	2370	1770	1550	1150	1700	1500
18	1650	1690	2090	1800	1500	4840	2310	1660	1360	1110	1710	1320
19	1750	1910	1640	1600	1800	4270	2580	1680	1410	1430	1980	1500
20	1840	1660	1660	1850	1650	3500	2610	1860	1350	1310	1990	2030
21	1740	1560	2110	1950	1400	3300	2520	1650	1490	1360	1270	1800
22	1660	1630	1750	2000	1900	2990	2710	1630	1520	1480	1240	1830
23	1680	1790	1650	1900	1950	2530	2650	1480	1420	1380	1820	1970
24	1320	1740	1900	1600	2100	2610	2370	1620	1620	1260	1750	2130
25	1590	1800	1650	1900	2150	2370	2270	1630	1510	1290	1830	1530
26	1740	1770	1450	1850	2200	2600	2280	1680	1150	1450	1470	1670
27	1700	1770	1600	1700	1900	2600	2140	1550	1050	1400	1510	2190
28	1600	1540	2000	1750	1950	2700	2260	1570	1530	1360	1320	2080
29	1610	1550	2050	1550	---	3040	2190	1200	1530	1370	1540	1920
30	1580	1830	1800	1500	---	3370	1790	1560	1450	1380	2080	2080
31	1500	---	1500	1450	---	3630	---	1490	---	1510	1800	---
TOTAL	50130	51700	53840	52550	51650	95650	84560	53240	44930	41900	50300	49790
MEAN	1617	1723	1737	1695	1845	3085	2819	1717	1498	1352	1623	1660
MAX	1840	2020	2110	2200	2300	6230	3800	2290	1920	1720	2080	2190
MIN	1320	1360	1200	1100	1400	1700	1790	1200	1050	1020	1180	1280
CFSM	.91	.97	.98	.95	1.04	1.73	1.58	.97	.84	.76	.91	.93
IN.	1.05	1.08	1.13	1.10	1.08	2.00	1.77	1.11	.94	.88	1.05	1.04

CAL YR 1976 TOTAL 810560 MEAN 2215 MAX 6700 MIN 1200 CFSM 1.24 IN 16.94
WTR YR 1977 TOTAL 680240 MEAN 1864 MAX 6230 MIN 1020 CFSM 1.05 IN 14.22

04126200 LITTLE MANISTEE RIVER NEAR FREESOIL, MI

LOCATION.--Lat 44°11'00", long 86°10'00", in NE¼ NE¼ sec.31, T.21 N. R.15 W., Manistee County, Hydrologic Unit 04060103, at partial-record streamflow station, on right bank 25 ft (8 m) upstream from Sixmile Bridge, 5.8 mi (9.3 km) north of Freesoil, 7.4 mi (11.9 km) upstream from mouth, and 9.0 mi (14.5 km) southeast of Manistee.

DRAINAGE AREA.--200 mi² (518 km²).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1956 to September 1977 (discontinued).

INSTRUMENTATION.--Temperature recorder since October 1956.

REMARKS.--Interruptions in the record were due to malfunctions of the recorder.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 22.5°C June 28, 29, 1971, July 22, 1972, July 6, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 22.5°C July 6; minimum recorded, 0.0°C Feb. 12, 13.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	12.0	10.0	6.5	5.5	2.0	2.0	1.5	1.5	1.0	0.5		
2	12.5	11.0	7.5	6.5	2.0	1.5	1.5	1.5	1.0	0.5		
3	13.0	11.5	7.5	5.5	2.0	2.0	1.5	1.5	1.0	1.0		
4	13.5	12.0	6.5	5.5	2.0	2.0	1.5	1.5	1.0	1.0		
5	13.5	11.5	6.5	6.0	2.0	2.0	1.5	1.5	0.5	0.5		
6	11.5	10.5	6.5	6.0	2.0	2.0	1.5	1.5	1.0	0.5		
7	10.5	9.5	6.5	5.0	2.0	2.0	1.5	1.5	1.0	1.0		
8	9.5	9.0	5.0	4.5	2.0	2.0	1.5	1.5	1.0	0.5		
9	9.0	8.5	5.5	4.5	1.5	1.5	1.5	1.5	1.0	0.5		
10	9.0	8.5	5.5	5.5	1.5	1.5	1.5	1.5	1.0	0.5		
11	10.0	8.0	5.5	4.5	1.5	1.5	1.5	1.5	1.0	0.5		
12	11.0	9.5	5.0	4.0	1.5	1.5	1.5	1.5	0.5	0.0		
13	11.0	10.0	4.5	4.0	1.5	1.5	1.5	1.5	0.5	0.0		
14	10.0	8.5	4.5	4.0	2.0	1.5	1.5	1.5	0.5	0.5		
15	9.0	8.5	4.0	3.0	2.0	1.5	1.5	1.5	---	---		
16	8.5	7.0	4.0	3.0	2.0	1.5	1.5	1.5	---	---		
17	7.5	7.0	4.5	4.0	3.0	2.0	1.5	1.0	---	---		
18	7.0	7.0	5.0	4.5	3.0	3.0	1.0	1.0	---	---		
19	7.0	6.5	5.0	4.5	3.5	2.5	1.0	1.0	---	---		
20	7.0	6.5	5.0	5.0	3.5	1.5	1.0	1.0	---	---		
21	7.0	6.5	5.0	4.5	1.5	1.5	1.0	1.0	---	---		
22	6.5	6.0	4.5	4.0	1.5	1.5	1.0	1.0	---	---		
23	6.5	5.5	4.0	4.0	1.5	1.5	1.0	1.0	---	---		
24	6.5	6.0	4.0	3.5	1.5	1.5	1.0	1.0	---	---		
25	7.0	6.5	4.0	3.0	1.5	1.5	1.0	1.0	---	---		
26	7.0	5.5	5.0	4.0	1.5	1.5	1.0	0.5	---	---		
27	5.5	5.0	5.0	4.0	1.5	1.5	1.0	0.5	---	---		
28	5.5	4.5	4.0	2.0	1.5	1.5	1.0	1.0	---	---		
29	6.5	5.5	2.0	2.0	1.5	1.0	1.0	1.0	---	---		
30	7.0	6.5	2.0	2.0	1.5	1.0	1.0	1.0	---	---		
31	7.5	6.5	---	---	1.5	1.5	1.0	1.0	---	---		
MONTH	13.5	4.5	7.5	2.0	3.5	1.0	1.5	0.5	1.0	0.0		

04126200 LITTLE MANISTEE RIVER NEAR FREESOIL, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1			---	---	14.0	12.0	14.5	13.5	18.5	16.0	16.5	16.0
2			---	---	15.0	11.0	17.0	12.0	17.0	15.0	16.0	14.5
3			---	---	15.5	11.0	15.5	14.0	15.5	13.5	15.5	13.0
4			---	---	14.5	12.5	19.0	15.0	16.0	14.0	15.5	13.5
5			---	---	17.0	14.0	21.0	17.0	16.5	15.5	15.0	13.5
6			---	---	16.0	13.0	22.5	18.5	17.5	15.0	14.0	12.5
7			---	---	15.5	11.5	20.5	18.5	17.0	16.0	15.5	13.5
8			---	---	13.5	12.0	20.5	17.0	17.0	15.5	16.0	14.0
9			---	---	14.5	10.5	19.5	17.0	16.5	15.0	16.5	14.5
10			---	---	13.5	11.0	19.5	15.5	16.5	15.5	15.0	13.5
11			---	---	12.5	12.5	19.0	16.0	15.5	14.5	13.0	11.5
12			---	---	12.5	12.0	20.5	17.0	16.0	13.0	13.5	11.5
13			---	---	15.0	11.5	20.0	16.5	15.5	14.0	13.5	12.5
14			---	---	16.5	12.5	19.5	16.0	16.5	13.5	13.5	11.0
15			---	---	17.0	13.5	20.5	17.5	15.5	13.5	13.0	12.0
16			---	---	17.0	14.5	20.5	17.0	15.5	14.5	13.0	12.0
17			---	---	---	---	21.5	18.0	16.0	14.0	13.0	13.0
18			---	---	---	---	19.5	17.5	15.5	12.5	14.0	13.0
19			---	---	---	---	21.0	16.5	14.0	12.5	14.0	14.0
20			---	---	---	---	22.0	19.0	14.0	11.5	14.0	12.5
21			---	---	---	---	21.0	18.5	13.5	12.5	12.5	12.0
22			---	---	---	---	20.0	16.0	14.5	12.0	12.5	12.0
23			---	---	---	---	18.5	16.0	14.0	12.5	12.5	12.0
24			---	---	---	---	17.5	16.0	14.0	11.5	12.5	12.5
25			19.5	16.0	---	---	18.0	15.0	14.0	11.0	13.5	12.0
26			19.0	16.0	---	---	17.0	14.0	14.5	13.0	13.5	12.5
27			19.0	15.0	---	---	17.0	13.0	17.5	14.5	13.0	12.5
28			19.0	15.0	---	---	16.5	14.0	17.5	16.5	13.5	12.5
29			18.5	15.0	18.5	---	17.0	15.5	17.5	15.5	12.5	12.0
30			17.5	15.0	16.5	14.5	18.5	15.5	16.5	14.0	12.5	12.0
31			16.0	14.0	---	---	19.0	16.5	17.0	15.0	---	---
MONTH			19.5	14.0	18.5	10.5	22.5	12.0	18.5	11.0	16.5	11.0

04126520 MANISTEE RIVER AT MANISTEE, MI
(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 44°14'54", long 86°19'25", in NW¼ NW¼ sec.12, T.21 N., R.17 W., Manistee County, Hydrologic Unit 04060103, at upstream side of bridge on Washington Street, in Manistee, and 1.0 mi (1.6 km) upstream from mouth.

DRAINAGE AREA.--2,000 mi² (5,180 km²), approximately.

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to current year.
WATER TEMPERATURES: November 1974 to current year.

INSTRUMENTATION.--Water-quality monitor since Mar. 18, 1977.

REMARKS.--Monitor located at upstream end of south pier of U.S. Highway 31 Bridge, 1,400 ft (427 m) upstream from station. Once-daily record based on samples collected by a local observer near monitor site. Water discharge measurements are made at times of monthly sampling.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,680 micromhos Nov. 18, 1974; minimum daily, 236 micromhos, Apr. 6, 1976.
WATER TEMPERATURES: Maximum daily, 25.0°C July 20, 21, 1977; minimum daily, 0.0°C on many days during 1976 and 1977.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 768 micromhos Nov. 12; minimum, 251 micromhos Apr. 10.
WATER TEMPERATURES: Maximum daily, 25.0°C July 20, 21; minimum daily, 0.0°C on many days during December and January.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UM-MF (COL./ 100 ML)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)
OCT												
05...	1000	1840	442	8.1	14.0	9.2	90	580	250	--	190	18
NOV												
12...	1015	--	471	7.8	2.0	12.8	96	610	89	64	190	26
DEC												
10...	1130	2320	440	7.6	.0	8.2	59	2700	168	180	--	--
JAN												
13...	1100	--	490	7.6	.0	10.4	72	260	180	63	190	26
FEB												
10...	1200	E1640	430	7.6	.0	10.9	76	2000	200	E76	170	6
MAR												
09...	1330	2790	436	7.7	1.0	9.2	90	3000	250	110	170	14
APR												
06...	1630	3930	418	7.7	4.0	12.2	93	2400	350	150	150	35
MAY												
04...	1330	2990	392	7.7	14.0	9.7	96	3200	120	825	180	49
JUN												
08...	1230	2470	487	8.2	18.5	7.8	85	7900	190	833	200	28
JUL												
13...	1300	1530	479	8.1	24.5	8.9	105	610	220	51	190	26
AUG												
03...	1240	2060	424	82.0	22.0	7.4	85	6800	250	190	180	41
SEP												
14...	1230	6720	448	8.3	18.0	8.4	89	7500	340	110	200	47

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
OCT												
05...	55	13	19	.6	1.5	210	0	172	2.7	12	50	.1
NOV												
12...	55	13	18	.6	1.5	200	0	164	5.1	10	50	.1
DEC												
10...	--	12	14	--	1.0	200	0	164	8.0	14	32	.1
JAN												
13...	54	14	20	.6	1.2	200	0	164	8.0	13	47	.1
FEB												
10...	48	13	19	.6	1.2	200	0	164	8.0	10	41	.1
MAR												
09...	47	12	16	.5	1.2	190	0	156	6.1	13	41	.1
APR												
06...	41	11	21	.8	1.3	140	0	115	4.5	14	47	.1
MAY												
04...	51	12	15	.5	1.6	160	0	131	5.1	15	37	.1
JUN												
08...	55	14	23	.7	1.7	210	0	172	2.1	15	60	.1
JUL												
13...	55	13	21	.7	1.5	200	0	164	2.5	8.0	56	.1
AUG												
03...	52	12	14	.5	1.2	170	0	139	.0	13	37	.1
SEP												
14...	56	14	19	.6	1.7	186	0	153	1.5	14	53	.2

E--ESTIMATED VALUE

RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	SUS-PENDED SEDI-MENT (MG/L)	SUS-PENDED SEDI-MENT DIS-CHARGE (T/DAY)	SUS. SED. SIEVE DIAM. % FINER THAN .062 MM
OCT											
05...	7.0	255	261	1270	.14	.37	1.6	.05	12	60	100
NOV											
12...	7.2	253	253	--	.19	.39	1.7	.03	4	--	100
DEC											
10...	8.6	233	--	1460	.35	.45	2.0	.03	8	50	100
JAN											
13...	9.6	268	258	--	.28	.51	2.3	.02	2	--	100
FEB											
10...	8.8	257	240	E1140	.42	1.9	8.5	.03	14	E62	100
MAR											
09...	7.6	238	231	1790	.36	.71	3.1	.03	9	68	100
APR											
06...	6.3	252	211	2670	.29	.59	2.6	.03	7	74	100
MAY											
04...	6.9	261	217	2110	.19	.74	3.3	.02	7	57	100
JUN											
08...	7.0	285	279	1900	.14	.53	2.3	.03	9	60	100
JUL											
13...	6.1	280	259	1160	.25	.69	3.1	.05	5	21	100
AUG											
03...	7.2	242	220	1350	.10	.32	1.4	.02	6	33	100
SEP											
14...	7.0	265	257	4810	.10	.40	1.8	.02	9	163	100

DATE	TIME	TOTAL ARSENIC (AS) (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	TOTAL CAD-MIUM (CD) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	TOTAL CHRO-MIUM (CR) (UG/L)	DIS-SOLVED CHRO-MIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	TOTAL IRON (FE) (UG/L)
OCT												
05...	1000	1	1	1	1	<10	<10	0	0	0	0	250
JAN												
13...	1100	2	1	2	1	<10	<10	0	0	0	0	220
APR												
06...	1630	0	0	2	1	10	<10	0	0	10	0	340
JUL												
13...	1300	3	0	--	6	20	0	0	0	6	2	420

DATE	DIS-SOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	TOTAL MAN-GANESE (MN) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	TOTAL SELE-NIUM (SE) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	TOTAL ZINC (ZN) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	TOTAL ORGANIC CARBON (C) (MG/L)
OCT												
05...	20	7	4	20	0	<.5	<.5	0	0	10	10	3.3
JAN												
13...	80	7	6	30	20	<.5	<.5	0	0	--	20	5.4
APR												
06...	70	5	5	30	10	<.5	<.5	0	0	20	20	7.0
JUL												
13...	30	30	20	30	10	.0	.0	0	0	40	20	7.8

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	TOTAL ALDRIN (UG/L)	ALDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ATRAZINE (UG/L)	ATRAZINE IN BOTTOM MATERIAL (UG/KG DRY SOLIDS)	TOTAL CHLORDANE (UG/L)	CHLORDANE IN BOTTOM MATERIAL (UG/KG)	TOTAL DDD (UG/L)	DDD IN BOTTOM MATERIAL (UG/KG)	TOTAL DDE (UG/L)
NOV										
12...	1015	ND	ND	ND	--	ND	ND	ND	ND	ND
FEB										
10...	1200	ND	--	ND	--	ND	--	ND	--	ND
MAY										
04...	1330	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	DDE IN BOTTOM MATERIAL (UG/KG)	TOTAL DDT (UG/L)	DDT IN BOTTOM MATERIAL (UG/KG)	TOTAL DIAZINON (UG/L)	DIAZINON IN BOTTOM MATERIAL (UG/KG)	TOTAL DIELDRIN (UG/L)	DIELDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ENDRIN (UG/L)	ENDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ETHION (UG/L)
NOV										
12...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FEB										
10...	--	ND	--	ND	--	ND	--	ND	--	ND
MAY										
04...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	ETHION IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR (UG/L)	HEPTACHLOR IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR EPOXIDE (UG/L)	HEPTACHLOR EPOXIDE IN BOTTOM MATERIAL (UG/KG)	TOTAL LINDANE (UG/L)	LINDANE IN BOTTOM MATERIAL (UG/KG)	TOTAL MALATHION (UG/L)	MALATHION IN BOTTOM MATERIAL (UG/KG)	TOTAL METHOXYCHLOR (UG/L)
NOV										
12...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FEB										
10...	--	ND	--	ND	--	ND	--	ND	--	ND
MAY										
04...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	METHOXYCHLOR IN BOTTOM MATERIAL (UG/KG)	TOTAL METHYL PARATHION (UG/L)	METHYL PARATHION IN BOTTOM MATERIAL (UG/KG)	TOTAL METHYL TRITHION (UG/L)	METHYL TRITHION IN BOTTOM MATERIAL (UG/KG)	TOTAL PARATHION (UG/L)	PARATHION IN BOTTOM MATERIAL (UG/KG)	SIMAZINE TOTAL COULSON COND. (UG/L)	SIMAZINE IN BOTTOM MATERIAL (UG/KG DRY SOLIDS)	TOTAL TOXAPHENE (UG/L)
NOV										
12...	ND	ND	ND	ND	ND	ND	ND	ND	--	ND
FEB										
10...	--	ND	--	ND	--	ND	--	ND	--	ND
MAY										
04...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	TOXAPHENE IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	TRITHION IN BOTTOM MATERIAL (UG/KG)	TOTAL 2,4-D (UG/L)	2,4-D IN BOTTOM MATERIAL (UG/KG)	TOTAL 2,4,5-T (UG/L)	2,4,5-T IN BOTTOM MATERIAL (UG/KG)	TOTAL SILVEX (UG/L)	SILVEX IN BOTTOM MATERIAL (UG/KG)
NOV									
12...	ND	ND	ND	ND	ND	ND	ND	ND	ND
FEB									
10...	--	ND	--	ND	--	ND	--	ND	--
MAY									
04...	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND--NOT DETECTED

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	OCT 5,76		NOV 12,76		DEC 10,76		JAN 13,77		FEB 10,77	
TIME	1000		1015		1130		1100		1200	
TOTAL CELLS/ML	4400		5500		310		250		86	
DIVERSITY: DIVISION	1.5		0.0		0.1		1.1		1.6	
.CLASS	1.5		0.1		0.5		1.1		1.6	
..ORDER	2.0		0.2		0.8		1.4		1.6	
...FAMILY	3.0		0.4		3.0		1.8		2.3	
....GENUS	3.6		0.6		3.3		1.9		0.0	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....ERRERELLA	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	550	12	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	160	4	30	1	--	-	3	1	4	5
....CLOSTERIOPSIS	--	-	--	-	--	-	--	-	--	-
....ECHINOSPHAERELLA	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	100	2	--	-	--	-	--	-	--	-
....WESTELLA	420	9	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	260	6	--	-	--	-	--	-	16#	19
..TETRASPORALES										
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	--	-	--	-	6	2	--	-
...PHACOTACEAE										
....COCCOMONAS	--	-	--	-	--	-	--	-	--	-
....PHACOTUS	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....STAURASTRUM	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	520	12	--	-	8	3	3	1	--	-
....MELOSIRA	990#	22	110	2	11	4	22	9	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	100	2	--	-	33	11	--	-	--	-
....COCCONEIS	160	4	*	0	8	3	3	1	--	-
...CYMBELLACEAE										
....AMPHORA	52	1	*	0	--	-	--	-	*	0
....CYMBELLA	--	-	30	1	22	7	--	-	*	0
....EPITHEMIA	--	-	--	-	--	-	8	3	--	-
...DIATOMACEAE										
....DIATOMA	--	-	*	0	11	4	6	2	4	5
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	5100#	92	58#	19	--	-	--	-
....FRAGILARIA	260	6	200	4	--	-	14	6	20#	24
....SYNEDRA	--	-	--	-	17	5	--	-	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	26	1	*	0	11	4	--	-	4	5
...NAVICULACEAE										
....NAVICULA	130	3	30	1	64#	21	14	6	*	0
....STAURONEIS	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	160	4	45	1	36	12	--	-	4	5
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....DINOBRYON	--	-	*	0	28	9	--	-	--	-
....OCHROMONAS	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	OCT 5,76 1000		NOV 12,76 1015		DEC 10,76 1130		JAN 13,77 1100		FEB 10,77 1200	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	310	7	--	-	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE	--	-	--	-	--	-	--	-	33#	38
....OSCILLATORIA	--	-	--	-	--	-	170#	67	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	160	4	--	-	3	1	--	-	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	26	1	--	-	--	-	3	1	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....PHACUS	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	26	1	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..GYMNODINIALES										
...GYMNODINIACEAE										
....GYMNODINIUM	--	-	--	-	--	-	--	-	--	-
..PERIDINIALES										
...CERATIACEAE										
....CERATIUM	--	-	--	-	--	-	--	-	--	-
...PERIDINIACEAE										
....PERIDINIUM	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
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04126920 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	MAY 4,77		JUN 8,77		JUL 16,77		AUG 3,77		SEP 14,77	
TIME	1330		1230		1300		1240		1230	
TOTAL CELLS/ML	1100		2400		14000		5000		5700	
DIVERSITY: DIVISION	1.4		1.9		1.4		1.5		1.2	
.CLASS	1.7		2.2		1.4		1.5		1.2	
..ORDER	2.1		2.8		2.4		2.0		1.5	
...FAMILY	2.8		3.3		2.6		2.3		1.7	
....GENUS	3.1		3.5		2.9		2.3		1.8	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	68	3	--	-	58	1	*	0
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	220	9	--	-	--	-	260	5
...MICRACTINIACEAE										
....ERMEDELLA	--	-	--	-	1500	10	--	-	--	-
....MICRACTINIUM	140	13	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	18	2	--	-	200	1	*	0	48	1
....CLOSTERIOPSIS	--	-	14	1	--	-	--	-	--	-
....ECHINOSPHAERELLA	--	-	--	-	--	-	--	-	*	0
....KIRCHNERIELLA	18	2	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	*	0	--	-
....WESTELLA	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	*	0	--	-	64	1
....CRUCIGENIA	--	-	--	-	--	-	100	2	--	-
....SCENEDESMUS	37	3	160	7	190	1	65	1	96	2
..TETRASPORALES										
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	160	1	2400#	48	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	--	-	*	0	--	-	--	-
....CHLAMYDOMONAS	--	-	120	5	*	0	--	-	*	0
...PHACOTACEAE										
....COCCOMONAS	9	1	--	-	--	-	--	-	--	-
....PHACOTUS	--	-	--	-	280	2	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....STAURASTRUM	--	-	--	-	*	0	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	380#	36	41	2	*	0	--	-	48	1
....MELOSIRA	73	7	540#	23	430	3	380	8	840	15
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	18	2	--	-	--	-	--	-	*	0
....COCCONEIS	*	0	--	-	--	-	*	0	*	0
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	490	10	*	0
....CYMBELLA	--	-	27	1	--	-	--	-	*	0
....EPITHEMIA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	*	0	14	1	--	-	*	0	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	82	3	*	0	--	-	--	-
....FRAGILARIA	--	-	54	2	1100	8	440	9	40	1
....SYNEDRA	18	2	--	-	*	0	--	-	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	*	0	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	18	2	82	3	--	-	*	0	72	1
....STAURONEIS	*	0	--	-	--	-	--	-	--	-
..NITZSCHIACEAE										
....NITZSCHIA	55	5	--	-	*	0	--	-	*	0
...SURIRELLACEAE										
....SURIRELLA	*	0	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	18	2	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....DINOBRYON	37	3	41	2	170	1	--	-	--	-
....OCHROMONAS	--	-	54	2	--	-	--	-	*	0

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAY 4,77 1330		JUN 8,77 1230		JUL 16,77 1300		AUG 3,77 1240		SEP 14,77 1230	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....AGMENELLUM	--	-	--	-	1300	9	--	-	--	-
....ANACYSTIS	--	-	160	7	2500#	18	--	-	96	2
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	940#	19	--	-
....APHANIZOMENON	--	-	--	-	5600#	40	--	-	--	-
...OSCILLATORIACEAE	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-	--	-	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	110	5	--	-	--	-	3900#	69
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	110	10	490#	21	200	1	*	0	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	110	10	--	-	110	1	--	-	40	1
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....PHACUS	--	-	--	-	*	0	--	-	--	-
....TRACHELOMONAS	9	1	68	3	--	-	*	0	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..GYMNODINIALES										
...GYMNODINIACEAE										
....GYMNODINIUM	--	-	--	-	*	0	--	-	--	-
..PERIDINIALES										
...CERATIACEAE										
....CERATIUM	--	-	--	-	*	0	--	-	--	-
...PERIDINIACEAE										
....PERIDINIUM	--	-	--	-	*	0	--	-	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

PERIPHYTON

DATE	LENGTH OF EXPOSURE (DAYS)	CHLOR-A PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)	CHLOR-B PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)
SEP 14...	42	1.44	1.67

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	551	411	468	421	419	538				---	489	
2	479	475	536	443	441	410				---	670	
3	475	467	393	428	533	471				---	538	
4	489	581	482	406	415	416				---	---	
5	477	427	432	388	428	521				---	---	
6	475	422	487	417	435	450				---	---	
7	433	441	412	420	414	377				---	---	
8	410	418	439	433	394	381				383	---	
9	496	531	402	433	423	465				---	---	
10	500	415	377	544	444	483				566	---	
11	435	401	421	451	452	339				---	---	
12	439	768	460	436	430	483				---	---	
13	487	652	505	483	502	375				---	---	
14	465	456	592	434	483	382				512	---	
15	462	434	493	446	414	316				---	---	
16	424	421	468	442	403	351				---	---	
17	514	384	458	571	398	319				---	---	
18	416	503	392	438	427	337				---	---	
19	489	519	367	446	416	---				396	---	
20	447	426	468	435	511	---				452	---	
21	503	524	489	697	610	---				385	---	
22	482	573	486	453	437	---				422	---	
23	408	449	422	433	472	---				382	---	
24	387	407	545	393	511	---				461	---	
25	533	416	636	457	488	---				457	---	
26	446	384	457	461	451	---				469	---	
27	430	405	473	433	394	---				---	---	
28	484	538	481	454	516	---				---	---	
29	414	593	422	406	---	---				---	---	
30	486	505	428	486	---	---				615	---	
31	398	---	414	491	---	---				---	---	

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1				---	---	---	457	309	392	381	315	354
2				---	---	---	456	306	362	391	308	353
3				---	---	---	482	346	399	420	346	383
4				---	---	---	425	313	364	485	343	388
5				---	---	---	505	334	402	449	339	381
6				---	---	---	421	336	380	446	343	391
7				---	---	---	395	258	321	520	363	398
8				---	---	---	356	275	316	447	393	421
9				---	---	---	356	255	304	556	379	428
10				---	---	---	341	251	284	429	369	395
11				---	---	---	329	255	294	434	356	394
12				---	---	---	373	265	302	444	349	389
13				---	---	---	363	260	304	486	351	392
14				---	---	---	361	283	321	463	362	394
15				---	---	---	381	269	313	470	350	406
16				---	---	---	349	285	311	500	351	398
17				---	---	---	370	269	307	482	361	411
18				412	333	365	335	266	295	456	367	405
19				420	337	373	371	279	316	454	386	406
20				408	319	358	363	286	313	508	378	417
21				427	306	357	356	284	317	506	371	434
22				429	324	361	385	313	337	505	372	429
23				496	324	411	391	306	341	469	378	409
24				451	357	408	383	316	351	465	406	434
25				398	319	356	437	360	385	503	392	431
26				385	313	345	448	345	390	523	392	443
27				362	296	328	409	315	347	470	404	430
28				407	306	343	472	332	358	660	399	459
29				473	295	368	401	342	371	633	423	512
30				475	325	389	374	303	339	611	409	471
31				507	372	418	---	---	---	548	424	455
MONTH				507	295	370	505	251	338	660	308	413

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	507	415	438	495	417	457	---	---	---	491	387	433
2	501	400	441	482	437	459	---	---	---	500	407	424
3	505	431	454	509	437	475	---	---	---	463	396	426
4	533	420	468	601	453	487	520	403	459	493	391	430
5	548	425	474	577	454	505	504	404	445	523	416	465
6	542	441	493	527	432	470	493	395	441	533	405	448
7	533	471	503	---	---	---	487	376	417	522	393	461
8	516	481	493	---	---	---	483	403	443	463	394	425
9	496	405	442	---	---	---	480	410	444	492	418	455
10	489	417	446	---	---	---	499	431	464	483	406	447
11	564	417	460	---	---	---	493	398	425	465	406	428
12	484	390	437	---	---	---	433	360	393	472	424	447
13	500	406	451	---	---	---	462	392	425	486	439	459
14	510	411	451	---	---	---	476	412	446	465	385	426
15	511	424	461	---	---	---	533	409	458	458	385	412
16	487	368	425	---	---	---	487	391	437	462	386	423
17	491	397	438	---	---	---	463	387	431	476	404	432
18	476	401	428	---	---	---	491	398	437	500	405	442
19	493	421	462	---	---	---	484	374	434	492	384	429
20	457	401	420	---	---	---	469	397	426	537	396	459
21	459	394	422	---	---	---	532	421	453	449	374	414
22	461	415	439	---	---	---	478	408	452	477	371	426
23	493	393	423	---	---	---	484	398	438	504	401	434
24	483	426	444	---	---	---	479	391	430	466	353	406
25	463	404	428	---	---	---	479	405	431	488	355	408
26	488	414	441	---	---	---	475	419	439	476	398	433
27	496	456	477	---	---	---	480	394	436	493	373	425
28	525	400	446	---	---	---	466	397	425	486	368	421
29	487	429	450	---	---	---	496	388	433	451	370	411
30	595	409	482	---	---	---	467	405	432	469	360	419
31	---	---	---	---	---	---	461	406	424	---	---	---
MONTH	595	368	451	601	417	476	533	360	436	537	353	432

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14.5	7.0	0.0	0.5	0.5	1.0				---	22.5	
2	15.0	7.5	0.0	0.5	1.0	1.5				---	22.5	
3	15.0	7.0	0.0	0.5	1.0	1.5				---	22.0	
4	16.0	6.5	0.0	0.5	1.0	1.5				---	---	
5	15.5	6.5	0.0	1.0	0.5	1.5				---	---	
6	14.5	6.5	0.0	0.5	1.0	1.5				---	---	
7	13.0	6.0	0.0	0.5	1.0	1.5				---	---	
8	13.0	6.0	0.0	0.5	1.0	1.5				22.5	---	
9	13.0	6.0	0.0	0.5	1.0	2.0				---	---	
10	12.5	6.0	0.0	0.5	1.5	2.5				22.5	---	
11	12.0	5.5	0.0	0.5	1.5	3.0				---	---	
12	12.5	5.0	0.0	0.5	1.5	3.0				---	---	
13	13.0	5.0	0.0	0.5	1.5	3.0				---	---	
14	12.5	5.0	0.0	0.5	1.0	3.0				23.5	---	
15	11.5	4.5	0.0	0.5	0.5	3.0				---	---	
16	10.5	4.5	0.0	0.5	0.5	2.5				---	---	
17	10.0	4.0	0.0	0.5	0.5	2.5				---	---	
18	9.5	4.0	0.0	0.5	1.0	1.5				---	---	
19	9.5	4.5	0.0	1.0	0.5	---				24.5	---	
20	9.5	4.5	0.0	1.0	0.5	---				25.0	---	
21	9.0	4.0	0.0	0.5	1.0	---				25.0	---	
22	9.0	3.5	0.0	1.0	1.5	---				24.0	---	
23	8.5	3.0	0.0	1.0	1.5	---				24.0	---	
24	8.0	3.0	0.0	1.0	1.5	---				24.0	---	
25	8.0	3.0	0.0	1.0	1.5	---				23.0	---	
26	8.0	3.0	0.0	1.0	1.5	---				22.5	---	
27	8.0	3.0	0.0	0.5	1.0	---				---	---	
28	7.5	2.5	0.0	0.5	1.5	---				---	---	
29	7.5	2.0	0.0	0.0	---	---				---	---	
30	7.0	1.5	0.0	0.0	---	---				23.0	---	
31	7.5	---	0.0	0.5	---	---				---	---	

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1				---	---	---	5.5	4.5	5.0	13.5	12.0	12.5
2				---	---	---	5.5	5.0	5.0	14.0	13.0	13.5
3				---	---	---	6.5	4.5	5.5	15.0	13.0	14.0
4				---	---	---	6.0	5.0	5.5	18.0	12.0	15.0
5				---	---	---	5.0	4.5	4.5	16.5	14.0	15.0
6				---	---	---	5.0	3.5	4.0	17.0	14.5	15.5
7				---	---	---	5.5	4.0	4.5	16.0	13.0	14.5
8				---	---	---	5.0	4.0	4.5	14.5	13.0	13.5
9				---	---	---	6.0	5.0	5.5	14.5	13.5	14.0
10				---	---	---	8.5	6.0	7.0	15.0	13.5	14.5
11				---	---	---	10.5	8.5	9.0	16.0	13.0	14.5
12				---	---	---	11.0	9.0	10.0	16.5	13.0	15.0
13				---	---	---	11.5	10.0	11.0	17.5	16.0	16.5
14				---	---	---	11.0	10.0	10.5	19.0	17.0	18.0
15				---	---	---	10.5	10.0	10.5	19.0	17.5	18.0
16				---	---	---	11.0	10.0	10.5	19.0	17.0	18.5
17				---	---	---	12.0	10.5	11.0	19.0	17.0	18.5
18				1.5	0.0	1.0	12.0	11.0	12.0	22.0	19.0	20.0
19				2.5	1.0	1.5	12.5	11.5	12.0	21.5	19.5	20.5
20				3.0	1.5	2.0	13.5	12.5	13.0	22.0	20.5	21.5
21				3.5	2.0	3.0	13.5	13.0	13.5	23.0	21.5	22.0
22				4.0	3.0	3.5	13.0	12.0	12.5	23.0	22.0	22.5
23				3.5	3.0	3.5	13.5	12.5	13.0	22.5	22.0	22.0
24				3.0	2.5	3.0	13.5	12.0	13.0	22.0	22.0	22.0
25				4.0	2.0	3.0	12.0	11.0	11.5	22.5	21.5	22.0
26				4.5	3.5	3.5	12.0	11.5	12.0	22.5	21.5	22.0
27				5.0	4.5	4.5	12.5	11.5	12.0	23.0	21.5	22.0
28				5.5	5.0	5.5	12.5	12.0	12.0	23.0	22.0	22.5
29				7.5	5.5	6.5	12.0	11.0	12.0	23.5	21.5	22.0
30				8.0	7.0	7.5	12.5	12.0	12.0	23.5	22.0	22.5
31				7.5	5.5	6.5	---	---	---	22.5	21.5	22.0
MONTH				8.0	0.0	4.0	13.5	3.5	9.5	23.5	12.0	18.5
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	22.0	19.0	20.5	20.5	18.5	19.0	---	---	---	22.0	21.5	22.0
2	19.0	18.5	18.5	19.5	18.0	19.0	---	---	---	21.5	21.0	21.5
3	19.5	18.0	18.5	20.5	19.0	20.0	---	---	---	21.5	20.5	21.0
4	20.0	18.5	19.0	21.0	19.5	20.5	22.5	21.5	22.0	21.0	20.5	20.5
5	21.0	18.5	20.0	23.5	20.5	21.5	22.5	22.0	22.0	21.0	21.0	21.0
6	21.0	19.0	20.0	23.5	22.0	23.0	23.5	22.5	22.5	21.0	20.0	20.5
7	19.0	17.0	18.5	---	---	---	23.5	22.5	23.0	21.0	20.0	20.5
8	19.0	17.5	18.5	---	---	---	24.0	23.0	23.0	21.0	20.5	20.5
9	18.0	17.0	17.5	---	---	---	23.5	22.0	23.0	21.0	21.0	21.0
10	18.5	17.0	18.0	---	---	---	23.0	22.5	22.5	21.0	19.5	20.0
11	18.0	16.5	18.0	---	---	---	22.5	21.0	22.0	19.5	19.0	19.0
12	18.0	17.0	17.5	---	---	---	21.0	21.0	21.0	19.5	19.0	19.0
13	18.0	17.0	17.5	---	---	---	21.0	21.0	21.0	19.5	19.0	19.5
14	19.0	17.5	18.0	---	---	---	21.0	21.0	21.0	19.5	18.5	19.0
15	20.0	17.5	19.0	---	---	---	21.5	21.0	21.0	19.5	18.5	19.0
16	21.0	19.0	20.0	---	---	---	21.5	21.0	21.5	19.0	18.5	18.5
17	22.0	18.5	20.5	---	---	---	21.0	20.5	21.0	19.0	19.0	19.0
18	22.0	19.0	21.0	---	---	---	20.5	20.0	20.0	19.5	19.0	19.0
19	21.5	19.5	20.5	---	---	---	20.0	19.5	20.0	19.5	19.0	19.0
20	21.5	19.5	20.5	---	---	---	20.0	19.0	19.5	19.0	18.0	18.5
21	21.5	18.5	20.0	---	---	---	20.0	19.0	19.5	18.0	17.5	17.5
22	21.5	19.5	20.5	---	---	---	20.0	19.5	19.5	18.0	17.0	17.5
23	21.5	19.5	20.5	---	---	---	20.0	19.0	19.5	18.0	17.5	17.5
24	21.0	19.0	20.5	---	---	---	19.5	18.0	19.0	18.0	17.5	17.5
25	21.0	20.0	21.0	---	---	---	19.5	18.5	19.0	18.0	17.0	17.5
26	21.5	20.5	21.0	---	---	---	20.0	19.0	19.5	18.0	18.0	18.0
27	21.5	20.0	21.0	---	---	---	21.5	20.0	20.5	18.0	17.0	17.0
28	23.0	21.0	22.0	---	---	---	22.5	21.5	22.0	17.0	16.5	17.0
29	21.5	20.5	21.0	---	---	---	22.0	21.5	21.5	17.0	16.5	16.5
30	21.5	20.0	21.0	---	---	---	21.5	21.0	21.0	16.5	16.5	16.5
31	---	---	---	---	---	---	22.0	21.0	21.5	---	---	---
MONTH	23.0	16.5	19.5	23.5	18.0	20.5	24.0	18.0	21.0	22.0	16.5	19.0

04127000 BOARDMAN RIVER NEAR MAYFIELD, MI

LOCATION.--Lat 44°38'18", long 85°31'10", in SE¼ NE¼ sec.21, T.26 N., R.10 W., Grand Traverse County, Hydrologic Unit 04060105, on right bank 25 ft (8 m) downstream from Brown's Bridge, 300 ft (91 m) downstream from East Creek, 0.9 mi (1.4 km) downstream from Brown's Bridge Dam, 1.0 mi (1.6 km) northeast of Mayfield, and 9.6 mi (15.4 km) southeast of Traverse City.

DRAINAGE AREA.--223 mi² (578 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1952 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 760 ft (230 m) by barometer.

REMARKS.--Water-discharge records good. Flow regulated by hydroelectric powerplant 0.9 mi (1.4 km) above station.

AVERAGE DISCHARGE.--25 years, 194 ft³/s (5.494 m³/s), 11.81 in/yr (300 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,220 ft³/s (34.6 m³/s) Sept. 14, 1961, gage height, 6.90 ft (2.103 m); minimum, 30 ft³/s (0.85 m³/s) Jan. 15, 1965, gage height, 2.53 ft (0.771 m); minimum daily, 47 ft³/s (1.33 m³/s) Nov. 2, 3, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 546 ft³/s (15.5 m³/s) Mar. 13, gage height, 5.18 ft (1.579 m); minimum, 44 ft³/s (1.25 m³/s) Jan. 22, gage height, 2.74 ft (0.835 m); minimum daily, 112 ft³/s (3.17 m³/s) Aug. 21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	163	172	162	140	136	157	502	191	167	146	203	155
2	167	167	160	140	131	158	496	201	158	153	163	160
3	167	160	158	143	134	157	431	201	155	153	162	169
4	158	167	157	146	134	155	370	199	150	153	160	165
5	148	177	157	148	133	157	374	199	151	146	155	167
6	153	191	155	150	134	151	358	199	163	140	146	162
7	163	191	155	148	136	151	351	197	163	146	145	155
8	193	181	155	148	141	158	321	197	162	145	153	155
9	193	172	153	148	150	174	231	193	160	140	153	153
10	191	172	151	146	148	187	207	187	162	140	167	151
11	175	172	153	141	160	203	266	187	165	140	160	151
12	157	174	153	141	177	251	275	185	165	140	169	148
13	157	177	148	143	179	463	280	175	162	140	183	131
14	157	175	141	140	167	447	278	163	157	141	183	131
15	157	174	140	133	151	403	289	163	157	138	169	128
16	158	174	140	151	155	439	285	163	160	133	165	129
17	160	174	145	167	153	405	264	165	157	133	163	136
18	162	174	153	160	151	360	257	169	151	136	150	136
19	165	169	151	163	148	333	271	169	151	140	140	146
20	165	163	150	151	148	305	243	172	150	140	114	150
21	169	163	146	150	148	259	233	179	148	153	112	150
22	169	165	148	143	146	223	245	179	148	145	245	150
23	162	165	146	153	145	251	245	169	148	145	233	177
24	163	163	146	150	153	213	243	153	148	145	197	213
25	167	163	146	145	165	187	233	153	148	146	157	217
26	174	165	146	145	175	233	223	153	148	146	151	223
27	174	167	138	141	174	266	213	158	143	146	145	213
28	172	163	136	146	165	324	231	163	138	146	155	205
29	172	162	133	145	---	450	205	170	138	151	163	187
30	172	163	136	146	---	502	191	175	145	158	157	167
31	179	---	136	145	---	520	---	175	---	183	155	---
TOTAL	5182	5115	4594	4556	4237	8642	8611	5502	4618	4507	5073	4880
MEAN	167	171	148	147	151	279	287	177	154	145	164	163
MAX	193	191	162	167	179	520	502	201	167	183	245	223
MIN	148	160	133	133	131	151	191	153	138	133	112	128
CFSM	.75	.77	.66	.66	.68	1.25	1.29	.79	.69	.65	.74	.73
IN.	.86	.85	.77	.76	.71	1.44	1.44	.92	.77	.75	.85	.81

CAL YR 1976 TOTAL 80862 MEAN 221 MAX 829 MIN 119 CFSM .99 IN 13.49
WTR YR 1977 TOTAL 65517 MEAN 179 MAX 520 MIN 112 CFSM .80 IN 10.93

04127000 BOARDMAN RIVER NEAR MAYFIELD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: June 1961 to current year.

INSTRUMENTATION.--Temperature recorder since June 1961.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 23.0°C July 2, 1963; minimum, 0.0°C on several days in 1963, 1968, 1970.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 20.5° July 21; minimum, 0.5°C on several days during January.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	11.0	11.0	6.5	6.0	3.5	3.0	1.0	1.0	1.0	1.0	3.0	3.0
2	12.0	11.0	6.5	6.5	2.5	2.0	1.0	0.5	1.0	1.0	3.0	3.0
3	12.5	11.5	6.5	6.0	2.0	2.0	0.5	0.5	1.0	1.0	3.0	3.0
4	12.5	11.5	6.0	6.0	2.0	2.0	0.5	0.5	1.0	1.0	3.0	3.0
5	12.0	12.0	6.0	6.0	2.0	2.0	0.5	0.5	1.0	1.0	3.0	3.0
6	12.0	12.0	6.0	6.0	2.0	2.0	1.0	0.5	1.0	1.0	3.0	3.0
7	11.5	11.0	6.0	6.0	2.0	2.0	1.0	1.0	1.0	1.0	3.5	3.0
8	11.0	10.5	6.0	5.5	2.0	2.0	1.0	1.0	1.0	1.0	3.5	3.5
9	10.5	10.5	5.5	5.5	2.0	2.0	1.0	1.0	1.0	1.0	4.0	3.5
10	11.0	10.5	5.5	5.0	2.0	2.0	1.0	1.0	1.0	1.0	4.5	4.0
11	10.5	9.5	5.0	5.0	2.0	2.0	1.0	0.5	1.0	1.0	5.0	4.5
12	9.5	9.5	5.0	4.5	2.0	2.0	0.5	0.5	1.5	1.0	5.0	4.5
13	9.5	9.5	4.5	4.5	1.5	1.5	0.5	0.5	1.5	1.5	5.0	4.5
14	9.5	9.5	4.5	4.0	1.5	1.5	0.5	0.5	2.0	1.5	5.5	5.0
15	9.5	9.5	4.0	4.0	1.5	1.5	0.5	0.5	2.5	2.0	5.5	5.5
16	9.5	9.5	4.0	4.0	1.5	1.5	0.5	0.5	2.5	2.5	5.5	5.5
17	9.5	9.0	4.0	4.0	1.5	1.5	0.5	0.5	2.5	2.0	5.5	5.0
18	9.0	8.5	4.0	4.0	1.5	1.5	0.5	0.5	2.0	2.0	5.0	4.0
19	8.5	8.0	4.0	4.0	1.5	1.5	0.5	0.5	2.0	2.0	4.0	4.0
20	8.0	7.5	4.0	4.0	2.0	1.5	1.0	1.0	2.0	2.0	4.0	4.0
21	7.5	7.0	3.5	3.5	2.0	2.0	1.0	1.0	2.0	2.0	4.0	4.0
22	7.5	7.0	3.5	3.5	2.0	2.0	1.0	1.0	2.0	2.0	4.0	4.0
23	7.0	7.0	3.5	3.5	2.0	2.0	1.0	1.0	2.0	2.0	4.0	4.0
24	7.0	7.0	3.5	3.5	1.5	1.5	1.0	1.0	2.0	2.0	4.5	4.0
25	7.0	7.0	3.5	3.5	1.5	1.5	1.0	1.0	2.0	2.0	4.5	4.5
26	7.0	6.5	3.5	3.5	1.5	1.5	1.5	1.0	2.5	2.0	4.5	4.5
27	6.5	6.5	3.5	3.5	1.5	1.5	1.5	1.5	3.0	2.5	4.5	4.5
28	6.5	6.5	3.5	3.5	1.5	1.0	1.5	1.5	3.0	3.0	4.5	4.5
29	6.0	6.0	3.5	3.5	1.0	1.0	1.5	1.5	---	---	5.0	4.5
30	6.0	6.0	3.5	3.0	1.0	1.0	1.5	1.5	---	---	5.0	5.0
31	6.0	6.0	---	---	1.0	1.0	1.5	1.0	---	---	6.0	5.0
MONTH	12.5	6.0	6.5	3.0	3.5	1.0	1.5	0.5	3.0	1.0	6.0	3.0

04127000 BOARDMAN RIVER NEAR MAYFIELD, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	6.0	6.0	11.5	11.5	14.5	12.5	16.0	14.5	15.5	15.0	18.5	16.5
2	6.0	5.5	14.0	11.5	13.5	12.5	16.0	15.0	15.5	15.0	18.0	17.0
3	5.5	5.0	13.5	13.0	13.0	12.5	16.0	14.5	15.0	14.0	17.0	16.5
4	5.5	5.0	13.0	13.0	13.0	12.5	17.0	15.5	14.5	14.5	16.5	15.0
5	5.0	4.5	12.5	11.5	14.5	13.0	17.0	16.0	14.0	13.5	16.5	16.0
6	4.5	4.5	13.5	12.0	14.5	14.5	18.5	17.5	16.0	14.5	16.0	16.0
7	4.5	4.0	13.5	13.0	14.5	13.0	19.0	18.5	16.0	15.5	16.0	16.0
8	4.0	3.5	12.5	12.0	14.5	13.0	18.0	17.5	16.0	14.5	16.0	15.5
9	4.5	4.0	12.0	11.5	14.0	13.0	18.5	17.5	16.0	15.5	15.0	14.0
10	5.5	4.5	12.5	11.0	14.0	13.0	18.0	17.5	16.0	14.5	15.0	14.5
11	7.5	5.5	12.5	12.0	13.0	13.0	17.5	17.0	14.5	14.0	15.0	14.5
12	10.0	7.5	12.5	10.0	13.0	12.5	17.0	15.0	14.5	14.0	14.5	14.0
13	12.0	10.0	12.0	10.5	14.0	12.5	19.0	17.0	15.0	14.5	14.5	14.5
14	12.5	12.0	14.5	12.0	14.0	13.0	18.0	16.0	15.0	15.0	14.5	13.5
15	12.5	11.5	13.5	13.5	14.0	14.0	17.5	17.0	15.0	15.0	14.5	14.5
16	11.5	11.0	14.5	12.5	14.0	13.5	17.5	17.0	15.0	14.5	14.5	13.5
17	12.0	11.0	14.5	13.5	15.5	14.0	18.0	17.0	14.5	14.5	13.5	13.0
18	12.0	11.5	16.5	14.0	15.5	13.5	18.0	17.5	14.5	13.5	14.0	13.5
19	12.5	12.0	16.5	15.0	15.0	14.0	17.5	17.0	14.5	13.5	14.0	13.5
20	12.5	12.0	16.0	15.0	15.5	15.0	18.5	17.5	13.5	13.0	13.5	13.0
21	13.0	11.5	16.5	14.5	16.0	15.0	20.5	18.5	13.5	13.5	13.5	13.5
22	14.0	13.0	16.5	16.0	16.5	15.5	19.0	18.0	13.5	13.0	13.5	13.5
23	14.0	13.5	15.5	14.0	16.0	15.0	18.5	17.5	14.0	13.5	13.5	13.5
24	14.0	13.0	17.5	15.5	16.0	15.5	18.0	17.0	15.0	14.0	13.5	13.0
25	13.0	12.5	17.0	16.0	18.0	16.0	17.5	16.5	14.5	14.0	13.0	12.5
26	13.0	12.0	17.5	16.0	16.5	16.0	17.5	16.0	14.0	14.0	12.5	12.5
27	12.5	11.0	17.0	16.0	16.5	16.5	16.0	16.0	14.0	13.0	12.5	12.5
28	12.5	12.0	17.0	16.0	16.5	15.5	16.0	15.0	16.5	14.0	12.5	12.5
29	12.5	11.5	17.5	16.5	16.5	16.0	16.5	15.0	18.0	16.5	12.5	12.5
30	11.5	11.5	17.0	16.0	16.5	16.0	16.5	15.5	18.0	17.5	13.0	13.0
31	---	---	16.0	14.5	---	---	16.5	13.5	17.5	15.5	---	---
MONTH	14.0	3.5	17.5	10.0	18.0	12.5	20.5	13.5	18.0	13.0	18.5	12.5

04127800 JORDAN RIVER NEAR EAST JORDAN, MI

LOCATION.--Lat 45°06'09", long 85°05'53", in NW¼ NW¼ sec.7, T.31 N., R.6 W., Antrim County, Hydrologic Unit 04060105, on right bank 600 ft (183 m) downstream from Webster Bridge, 4.2 mi (6.8 km) south of East Jordan and 4.5 mi (7.2 km) upstream from mouth.

DRAINAGE AREA.--67.6 mi² (175 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1960-65. October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 610 ft (186 m) from topographic map. Nov. 19, 1959, to Sept. 30, 1966, nonrecording gage at present site and at site 600 ft (183 m) upstream at same datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Some regulation during low flows from fish hatchery above station.

AVERAGE DISCHARGE.--11 years, 187 ft³/s (5.296 m³/s), 37.57 in/yr (954 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,360 ft³/s (38.5 m³/s) July 19, 1975, gage height, 6.51 ft (1.984 m); minimum, 109 ft³/s (3.09 m³/s) Mar. 1, 8, 1967, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 400 ft³/s (11.3 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Jan. 19	--	ice jam		*5.36	1.634	Aug. 10	1100	418	11.8	4.65	1.417
Mar. 13	1900	471	13.3	4.84	1.475	Aug. 29	0300	491	13.9	4.90	1.494
Mar. 15	2200	522	14.8	4.98	1.518	Sept. 5	0400	438	12.4	4.73	1.442
Mar. 29	2100	*598	16.9	5.15	1.570						

Minimum discharge, 157 ft³/s (4.45 m³/s) Feb. 21, gage height, 3.02 ft (0.920 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	160	180	190	175	190	200	268	189	191	172	185	178
2	160	177	190	175	185	195	265	191	188	168	209	177
3	160	179	190	175	180	195	265	188	177	165	190	177
4	159	190	190	175	180	206	240	186	174	166	177	203
5	163	188	185	170	180	224	249	203	173	198	240	300
6	182	182	185	170	180	204	229	199	222	177	216	200
7	178	180	180	170	185	202	220	189	184	195	185	200
8	174	176	180	170	185	203	213	189	176	204	184	185
9	173	176	180	170	185	226	222	188	173	180	172	177
10	173	179	180	170	190	246	254	188	172	170	308	173
11	173	178	175	170	195	249	268	186	173	166	198	174
12	173	180	175	175	199	347	246	186	178	179	176	176
13	173	179	175	180	222	461	231	185	173	171	172	194
14	178	180	175	180	200	384	217	184	171	167	176	190
15	178	177	175	180	200	408	215	183	168	167	170	177
16	188	176	175	180	195	380	217	183	170	166	200	185
17	184	178	175	180	195	255	209	182	174	176	191	213
18	179	182	175	180	195	233	206	182	170	172	173	186
19	178	182	175	180	190	223	203	180	168	173	176	193
20	177	182	170	180	190	229	207	179	179	166	176	230
21	180	178	170	175	190	220	212	183	166	174	180	199
22	195	179	170	175	190	215	240	178	167	165	188	188
23	179	182	170	175	198	212	206	174	166	164	184	193
24	174	182	170	175	231	203	199	174	167	194	172	212
25	173	180	170	175	233	202	198	173	170	222	170	252
26	171	190	170	170	208	208	194	172	165	174	167	240
27	171	194	170	165	204	286	193	172	164	168	170	270
28	171	186	170	170	200	474	191	172	164	168	216	213
29	172	185	170	175	---	548	191	171	165	171	358	202
30	176	190	170	180	---	468	191	171	170	170	194	199
31	208	---	170	185	---	366	---	173	---	208	179	---
TOTAL	5433	5447	5465	5425	5475	8672	6659	5653	5218	5476	6052	6056
MEAN	175	182	176	175	196	280	222	182	174	177	195	202
MAX	208	194	190	185	233	548	268	203	222	222	358	300
MIN	159	176	170	165	180	195	191	171	164	164	167	173
CFSM	2.59	2.69	2.60	2.59	2.90	4.14	3.28	2.69	2.57	2.62	2.89	2.99
IN.	2.99	3.00	3.01	2.99	3.01	4.77	3.66	3.11	2.87	3.01	3.33	3.33

CAL YR 1976 TOTAL 69837 MEAN 191 MAX 578 MIN 136 CFSM 2.83 IN 38.43
WTR YR 1977 TOTAL 71031 MEAN 195 MAX 548 MIN 159 CFSM 2.89 IN 39.09

04127800 JORDAN RIVER NEAR EAST JORDAN, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1966 to current year.

INSTRUMENTATION.--Temperature recorder since October 1966.

REMARKS.--Interruptions in the record were due to malfunctions of the recorder.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 20.0°C July 11, 1976; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 19.5°C July 20; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	9.0	8.0	5.0	4.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
2	9.0	9.0	4.5	4.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
3	9.0	8.5	4.5	3.5	1.0	1.0	0.0	0.0	0.0	0.0	0.5	0.0
4	10.0	9.0	3.5	3.5	1.0	1.0	0.0	0.0	0.0	0.0	0.5	0.5
5	10.0	10.0	3.5	3.5	1.0	1.0	0.0	0.0	0.0	0.0	0.5	0.5
6	10.0	9.0	3.5	3.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	0.5
7	9.0	8.0	3.5	3.0	1.0	1.0	0.0	0.0	0.0	0.0	2.0	1.0
8	8.0	7.5	3.0	2.0	1.0	1.0	0.0	0.0	0.0	0.0	2.0	2.0
9	7.5	7.0	2.0	2.0	1.0	1.0	0.0	0.0	0.5	0.0	3.5	2.0
10	7.0	7.0	2.0	2.0	1.0	1.0	0.0	0.0	1.5	0.5	3.5	3.0
11	7.5	7.0	2.0	2.0	1.0	1.0	0.0	0.0	2.0	1.5	3.5	3.0
12	8.5	7.5	2.0	2.0	1.0	1.0	0.0	0.0	2.0	1.5	3.5	3.0
13	8.5	8.5	2.0	2.0	0.5	0.5	0.0	0.0	1.5	1.0	3.0	3.0
14	8.5	7.0	2.0	2.0	0.5	0.5	0.0	0.0	1.0	0.0	3.0	3.0
15	7.0	7.0	2.0	1.5	1.5	1.0	0.0	0.0	0.0	0.0	3.0	3.0
16	7.0	6.5	1.5	1.5	1.5	1.5	0.0	0.0	0.0	0.0	3.0	3.0
17	6.5	6.0	2.0	1.5	1.5	1.5	0.0	0.0	0.0	0.0	3.0	2.0
18	6.0	5.5	2.5	2.0	1.5	1.5	0.0	0.0	0.0	0.0	2.5	2.0
19	5.5	5.5	2.5	2.5	2.0	1.5	0.0	0.0	0.0	0.0	2.5	2.0
20	5.5	5.5	2.5	2.5	2.0	1.0	0.0	0.0	0.0	0.0	2.5	2.5
21	5.5	5.0	2.5	2.0	1.0	0.5	0.0	0.0	0.0	0.0	2.5	2.5
22	5.0	4.5	2.0	2.0	0.5	0.5	0.0	0.0	1.0	0.0	2.5	2.0
23	4.5	4.5	2.0	2.0	0.5	0.5	0.5	0.0	1.0	0.0	2.5	2.0
24	4.5	4.5	2.0	2.0	0.5	0.5	0.5	0.5	0.5	0.0	2.0	0.5
25	4.5	4.5	2.0	2.0	0.5	0.5	0.5	0.5	0.5	0.5	2.5	0.5
26	4.5	4.5	3.0	2.0	0.5	0.5	0.5	0.0	0.5	0.5	3.0	1.0
27	4.5	4.0	3.0	3.0	0.5	0.0	0.0	0.0	0.5	0.0	3.0	3.0
28	4.0	3.5	3.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	2.5
29	4.0	3.5	1.0	1.0	0.0	0.0	0.0	0.0	---	---	4.5	3.0
30	5.0	4.0	1.0	1.0	0.0	0.0	0.0	0.0	---	---	4.5	4.0
31	5.0	5.0	---	---	0.0	0.0	0.0	0.0	---	---	4.0	4.0
MONTH	10.0	3.5	5.0	1.0	2.0	0.0	0.5	0.0	2.0	0.0	4.5	0.0

04127800 JORDAN RIVER NEAR EAST JORDAN, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	5.0	4.0	12.0	11.0	12.0	12.0	12.5	12.5	16.0	15.0	15.0	14.5
2	5.0	5.0	12.5	11.5	12.0	10.0	14.0	11.0	16.0	14.5	15.0	13.5
3	5.5	5.0	12.5	9.5	12.0	10.0	14.0	13.0	14.5	12.5	13.5	11.5
4	5.5	4.5	12.5	11.0	13.0	11.0	16.0	13.0	14.0	13.0	13.0	11.5
5	4.5	4.0	12.5	12.5	13.0	12.5	17.0	15.5	16.0	14.0	13.0	13.0
6	4.0	3.5	12.5	11.5	13.0	12.0	18.5	16.5	15.5	15.0	13.0	11.5
7	3.5	3.5	12.5	10.0	12.5	10.0	18.5	17.0	15.5	14.5	11.5	11.5
8	4.0	3.0	10.0	9.5	13.0	10.5	17.0	15.0	15.0	14.0	12.5	11.5
9	5.5	3.5	10.5	8.5	13.0	10.5	16.5	15.0	15.0	13.5	14.5	12.5
10	8.5	5.5	11.5	9.0	13.0	11.0	16.0	13.5	14.5	14.0	14.0	12.0
11	10.5	8.0	12.5	10.0	13.0	12.5	16.0	14.5	14.5	14.0	12.0	9.5
12	11.0	10.0	12.5	11.0	12.5	12.0	17.5	15.5	14.0	12.5	11.0	10.5
13	11.0	10.0	14.5	12.0	13.0	11.0	17.5	16.0	14.0	12.5	11.0	11.0
14	10.0	8.0	15.0	13.0	14.5	11.5	16.5	14.0	13.0	12.5	11.0	10.0
15	9.0	8.5	15.5	13.5	15.0	13.0	16.5	15.0	13.5	12.0	11.0	10.0
16	10.0	8.5	16.0	14.5	15.0	14.0	17.0	15.0	12.5	12.5	11.0	10.0
17	11.0	10.0	16.0	15.5	16.0	14.0	18.0	16.5	12.5	12.0	11.5	11.0
18	12.5	11.0	14.5	15.0	16.0	15.0	18.0	16.5	12.5	11.0	12.5	11.5
19	12.5	11.5	16.5	15.0	15.5	14.0	18.0	15.0	11.5	11.0	12.5	12.5
20	12.5	12.5	17.0	15.0	14.0	13.0	19.5	17.5	11.0	10.0	12.5	11.5
21	12.5	12.0	18.0	15.5	---	---	18.5	18.0	11.0	11.0	11.5	11.5
22	12.5	11.5	18.0	16.5	---	---	18.0	14.5	12.0	11.0	11.5	11.5
23	12.5	10.5	16.5	16.0	---	---	16.0	14.5	11.5	11.5	11.5	11.5
24	12.0	11.0	16.5	15.0	---	---	16.0	14.5	11.5	10.5	11.5	11.5
25	11.5	10.0	16.5	15.0	---	---	16.0	14.5	11.5	10.0	12.0	11.5
26	11.0	9.0	16.5	14.0	---	---	16.5	13.0	13.0	11.5	12.0	12.0
27	12.0	10.0	16.5	14.0	16.5	15.0	14.5	12.5	15.5	13.0	12.0	12.0
28	12.0	10.5	16.5	14.0	16.5	15.5	14.5	13.5	16.0	15.5	12.0	11.5
29	10.5	8.0	16.5	14.0	16.0	14.0	14.5	13.5	16.0	15.5	11.5	10.5
30	11.5	10.0	14.0	11.5	14.0	12.5	15.0	14.0	15.5	13.0	10.5	10.5
31	---	---	13.5	12.0	---	---	16.0	14.5	14.5	13.5	---	---
MONTH	12.5	3.0	18.0	8.5	16.5	10.0	19.5	11.0	16.0	10.0	15.0	9.5

04127918 PINE RIVER NEAR RUDYARD, MI

LOCATION.--Lat 46°11'09", long 84°35'52", in NW¼ NE¼ sec.30, T.44 N., R.2 W., Chippewa County, Hydrologic Unit 04070002, on right bank 15 ft (5 m) upstream from county highway bridge, 3.2 mi (5.1 km) south of Rudyard.

DRAINAGE AREA.--184 mi² (477 km²).

PERIOD OF RECORD.--April 1972 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 600 ft (183 m) from topographic map (nearest 10 ft). Prior to Aug. 4, 1972, non-recording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Dec. 11 to Jan. 12, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--5 years, 231 ft³/s (6.542 m³/s), 17.05 in/yr (433 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,190 ft³/s (119 m³/s) June 18, 1975, gage height, 17.62 ft (5.371 m); minimum, 56 ft³/s (1.59 m³/s) July 28, 1977, gage heignt, 1.86 ft (0.567 m).

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 50.3 ft³/s (1.42 m³/s) was measured Aug. 6, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft³/s (34.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 30	0100	1,500	42.5	*a17.43	5.313	Apr. 22	0300	1,460	41.3	7.88	2.402
Apr. 13	2300	*2,090	59.2	10.43	3.179						

a Ice jam.

Minimum discharge, 56 ft³/s (1.59 m³/s) July 28, gage height, 1.86 ft (0.567 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	64	75	66	64	62	80	1000	239	76	100	100	113
2	67	75	66	62	62	80	900	239	82	113	81	104
3	67	75	64	62	62	82	800	219	81	111	76	94
4	65	77	64	62	62	82	720	206	78	135	71	83
5	64	83	64	60	62	84	680	207	75	133	72	85
6	75	88	62	60	64	86	660	246	81	121	76	86
7	75	84	62	60	64	84	640	230	92	114	79	83
8	72	80	62	60	64	84	620	212	84	104	71	81
9	69	76	62	60	64	82	620	193	78	112	67	78
10	67	73	62	60	64	84	700	181	75	102	64	72
11	64	73	60	60	64	90	1000	163	73	89	66	71
12	63	89	60	60	64	130	1920	158	71	81	66	74
13	65	70	60	60	64	210	1950	150	72	76	62	83
14	70	74	60	60	64	350	1840	134	71	72	66	111
15	73	73	60	60	64	450	1590	123	70	73	66	108
16	74	70	62	60	64	600	1350	117	69	73	70	94
17	74	69	62	60	64	580	1240	117	69	70	95	88
18	73	67	62	60	64	550	1270	124	72	68	87	87
19	73	68	64	60	64	520	1290	116	102	67	81	84
20	75	67	64	60	64	500	1130	234	101	66	85	113
21	76	64	64	60	66	480	1120	207	88	65	82	127
22	77	64	64	60	68	460	1370	177	79	62	82	112
23	79	68	64	60	70	440	1210	152	74	60	87	108
24	82	67	64	60	72	430	876	126	73	58	85	102
25	78	66	64	60	74	410	650	112	80	60	75	144
26	76	69	64	60	74	420	500	102	77	60	70	180
27	74	70	64	60	76	500	400	93	76	58	74	189
28	74	68	64	60	78	660	326	88	99	57	149	166
29	72	68	64	60	---	900	287	81	105	62	152	178
30	74	70	64	60	---	1300	254	76	104	67	127	256
31	74	---	64	60	---	1150	---	74	---	72	110	---
TOTAL	2225	2180	1952	1870	1848	11958	28913	4896	2427	2561	2594	3354
MEAN	71.8	72.7	63.0	60.3	66.0	386	964	158	80.9	82.6	83.7	112
MAX	82	89	66	64	78	1300	1950	246	105	135	152	256
MIN	63	64	60	60	62	80	254	74	69	57	62	71
CFSM	.39	.40	.34	.33	.36	2.10	5.24	.86	.44	.45	.46	.61
IN.	.45	.44	.39	.38	.37	2.42	5.85	.99	.49	.52	.52	.68

CAL YR 1976 TOTAL 73502 MEAN 201 MAX 2920 MIN 57 CFSM 1.09 IN 14.86
WTR YR 1977 TOTAL 66778 MEAN 183 MAX 1950 MIN 57 CFSM 1.00 IN 13.50

04128000 STURGEON RIVER NEAR WOLVERINE, MI

LOCATION.--Lat 45°17'56", long 84°36'40", in SE¼ NE¼ sec.36, T.34 N., R.3 W., Cheboygan County, Hydrologic Unit 04070004, on left bank 1.8 mi (2.9 km) north of Wolverine, 2.8 mi (4.5 km) downstream from West Branch, and 9 mi (14 km) upstream from mouth.

DRAINAGE AREA.--170 mi² (440 km²), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1942 to current year.

REVISED RECORDS.--WSP 1307: 1944(M), 1948(M). WSP 1727: 1951(M).

GAGE.--Water-stage recorder. Altitude of gage is 740 ft (226 m), from topographic map. Prior to June 15, 1942, nonrecording gage at site 1.0 mi (1.6 km) upstream, and June 16, 1942, to Sept. 30, 1958, at site 0.7 mi (1.1 km) upstream at different datums.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Prior to July 1975 intermittent regulation at low flows from ponds 2.4 mi (3.9 km) above station.

AVERAGE DISCHARGE.--35 years, 217 ft³/s (6.145 m³/s), 17.33 in/yr (440 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,290 ft³/s (36.5 m³/s) Sept. 29, 1972, gage height, 3.72 ft (1.134 m); minimum, 94 ft³/s (2.66 m³/s) Jan. 19, 1971, result of freezeup; minimum daily, 113 ft³/s (3.20 m³/s) Aug. 6, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 735 ft³/s (20.8 m³/s) Mar. 29, gage height, 2.93 ft (0.893 m); minimum, 154 ft³/s (4.36 m³/s) July 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	191	254	230	180	205	240	430	224	227	176	208	227
2	189	224	220	185	210	230	389	237	221	173	251	205
3	189	221	215	185	210	211	407	224	199	169	254	205
4	189	224	210	185	210	214	364	214	196	169	194	194
5	191	224	200	185	210	221	352	244	194	171	237	202
6	211	218	200	185	210	214	324	265	237	176	205	205
7	211	214	195	180	215	214	312	227	230	262	186	224
8	199	211	190	175	220	218	293	218	202	296	202	211
9	199	211	185	170	230	254	304	211	194	227	186	202
10	199	214	185	180	230	308	344	211	191	194	320	186
11	199	211	180	190	230	308	425	205	191	183	262	186
12	199	211	180	195	227	376	443	202	196	186	202	196
13	205	211	180	200	244	466	389	199	191	186	191	258
14	211	211	185	200	235	443	348	199	183	176	191	265
15	214	205	185	205	220	470	316	196	178	173	183	218
16	218	202	185	210	210	535	300	196	178	171	244	224
17	214	205	180	215	215	407	293	202	181	189	296	237
18	208	211	180	220	215	356	279	196	181	191	214	218
19	205	211	180	220	210	328	276	196	178	181	214	230
20	208	211	180	215	200	328	304	196	191	169	221	364
21	218	205	180	210	200	304	293	196	194	167	202	290
22	248	205	180	210	205	293	296	191	181	160	227	254
23	244	205	180	210	208	290	272	191	176	158	218	230
24	230	208	175	205	262	276	258	186	173	162	196	248
25	227	208	175	200	293	276	254	186	173	191	189	394
26	218	211	175	195	244	276	240	186	171	171	186	300
27	214	221	175	185	227	368	237	183	165	162	183	389
28	211	218	170	190	230	575	234	181	165	162	208	328
29	211	218	170	195	---	680	230	181	167	165	360	279
30	214	220	175	200	---	710	230	181	171	165	254	272
31	286	---	175	205	---	575	---	189	---	205	227	---
TOTAL	6570	6423	5775	6085	6225	10964	9436	6313	5675	5686	6911	7441
MEAN	212	214	186	196	222	354	315	204	189	183	223	248
MAX	286	254	230	220	293	710	443	265	237	296	360	394
MIN	189	202	170	170	200	211	230	181	165	158	183	186
CFSM	1.25	1.26	1.09	1.15	1.31	2.08	1.85	1.20	1.11	1.08	1.31	1.46
IN.	1.44	1.41	1.26	1.33	1.36	2.40	2.06	1.38	1.24	1.24	1.51	1.63

CAL YR 1976 TOTAL 87614 MEAN 239 MAX 745 MIN 167 CFSM 1.41 IN 19.17
WTR YR 1977 TOTAL 83504 MEAN 229 MAX 710 MIN 158 CFSM 1.35 IN 18.27

04128000 STURGEON RIVER NEAR WOLVERINE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1958 to current year.

INSTRUMENTATION.--Temperature recorder since October 1958.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.0°C June 30, 1964; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 22.5°C July 20, 21; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	10.5	9.0	4.5	4.0	1.5	1.5	0.0	0.0	0.0	0.0	1.0	0.0
2	10.5	9.5	4.0	4.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0
3	10.5	9.5	4.0	4.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0
4	10.5	9.5	4.0	4.0	1.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
5	10.5	10.5	4.0	4.0	0.5	0.0	0.0	0.0	0.0	0.0	1.0	0.5
6	10.5	9.5	4.0	4.0	0.5	0.0	0.0	0.0	0.0	0.0	1.5	1.0
7	9.5	9.0	4.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	1.5
8	9.0	8.5	4.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	3.0	2.0
9	8.5	8.5	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	2.5
10	8.5	8.0	3.0	3.0	0.0	0.0	0.0	0.0	0.5	0.0	4.5	3.5
11	8.5	8.0	3.0	3.0	0.0	0.0	0.0	0.0	0.5	0.0	4.5	3.5
12	9.5	8.0	3.0	3.0	0.0	0.0	0.0	0.0	0.5	0.0	4.5	4.0
13	9.5	9.0	3.0	3.0	0.0	0.0	0.0	0.0	0.5	0.0	4.5	3.5
14	9.0	7.5	3.0	3.0	0.0	0.0	0.0	0.0	0.5	0.0	4.0	3.5
15	7.5	7.5	3.0	2.5	0.0	0.0	0.0	0.0	0.5	0.0	5.0	4.0
16	7.5	7.5	2.5	2.5	0.0	0.0	0.0	0.0	0.5	0.0	5.0	4.0
17	7.5	7.0	2.5	2.5	0.5	0.0	0.0	0.0	1.0	0.0	4.5	4.0
18	7.0	7.0	2.5	2.5	0.5	0.5	0.0	0.0	1.0	0.0	4.0	3.0
19	7.0	7.0	2.5	2.5	0.5	0.5	0.0	0.0	1.0	0.0	4.5	3.0
20	6.5	6.5	2.5	2.0	0.5	0.0	0.0	0.0	1.0	0.0	5.0	3.5
21	6.5	6.0	2.0	2.0	0.0	0.0	0.0	0.0	1.0	0.0	5.0	4.5
22	6.0	6.0	2.0	2.0	0.0	0.0	0.0	0.0	1.0	0.0	5.5	4.5
23	6.0	5.0	2.0	2.0	0.0	0.0	0.0	0.0	1.0	0.0	5.5	4.0
24	5.0	5.0	2.0	2.0	0.0	0.0	0.0	0.0	1.0	0.0	5.5	4.0
25	5.0	5.0	2.0	2.0	0.0	0.0	0.0	0.0	1.0	0.0	4.5	3.5
26	5.0	5.0	2.0	2.0	0.0	0.0	0.0	0.0	1.0	0.0	4.0	3.5
27	4.5	4.0	2.0	2.0	0.0	0.0	0.0	0.0	1.0	0.0	6.0	3.5
28	4.0	4.0	2.0	2.0	0.0	0.0	0.0	0.0	1.0	0.0	6.5	5.5
29	4.0	4.0	2.0	1.5	0.0	0.0	0.0	0.0	1.0	0.0	6.0	6.0
30	4.5	4.0	1.5	1.5	0.0	0.0	0.0	0.0	---	---	6.5	5.5
31	4.5	4.0	---	---	---	---	0.0	0.0	---	---	6.0	5.0
											6.0	5.0
MONTH	10.5	4.0	4.5	1.5	1.5	0.0	0.0	0.0	1.0	0.0	6.5	0.0

04128000 STURGEON RIVER NEAR WOLVERINE, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	9.0	4.5	12.5	10.0	13.0	12.5	13.5	13.0	18.0	15.5	16.5	16.0
2	6.5	4.5	12.0	9.5	14.5	12.0	16.5	12.0	18.0	15.5	16.5	14.0
3	8.0	4.5	12.0	8.5	14.5	12.0	16.0	13.5	15.5	14.0	14.0	12.0
4	6.0	4.0	12.0	9.5	15.0	12.0	18.5	14.0	16.5	14.5	14.0	12.5
5	4.5	4.0	12.0	11.0	15.0	13.0	20.0	16.5	18.0	15.5	13.0	13.0
6	6.5	4.0	13.0	10.5	14.5	12.5	20.5	17.5	18.0	16.0	13.0	12.0
7	6.5	4.0	13.0	9.5	14.0	12.0	20.0	17.0	17.5	15.5	12.0	12.0
8	5.5	4.0	11.5	9.0	14.0	12.0	18.5	16.0	17.5	15.0	13.0	11.5
9	7.0	4.0	10.5	8.0	14.0	12.0	18.0	16.0	17.5	14.5	15.0	13.0
10	9.5	6.0	11.5	8.0	14.5	12.0	17.5	14.0	16.0	14.5	15.0	12.0
11	11.5	8.5	13.0	8.5	14.5	12.5	18.0	14.5	15.5	15.0	12.0	11.0
12	11.0	9.5	13.0	10.0	13.5	12.0	19.5	16.5	15.5	13.5	12.0	11.5
13	10.5	10.0	14.5	11.5	14.0	12.0	19.5	16.5	15.5	14.0	12.0	12.0
14	10.0	8.0	15.5	11.5	15.5	12.0	19.0	15.0	14.5	13.0	12.5	11.0
15	9.5	8.0	15.5	11.5	17.0	12.5	18.5	16.5	14.5	13.0	12.0	11.0
16	10.5	8.5	17.0	13.5	17.0	14.0	19.5	16.0	14.0	13.0	11.5	11.0
17	12.0	9.5	17.5	14.5	18.5	15.0	20.0	17.5	14.0	13.0	12.5	11.5
18	12.0	11.0	18.0	15.0	18.5	15.5	20.0	17.5	14.0	12.5	13.0	12.5
19	13.0	10.5	17.5	14.5	17.5	15.0	20.5	16.0	13.5	12.5	13.0	13.0
20	12.5	12.0	17.5	15.0	15.5	13.5	22.5	19.0	12.5	11.5	13.0	12.0
21	13.0	12.0	18.5	15.0	16.5	12.5	22.5	19.0	12.5	12.0	12.0	11.5
22	12.5	11.0	18.0	15.5	17.0	13.0	20.0	16.5	13.5	11.5	11.5	11.5
23	12.5	10.0	18.0	15.5	17.0	14.0	18.5	16.5	13.5	12.0	11.5	11.5
24	12.0	10.0	18.5	15.0	17.5	14.0	18.0	16.5	13.0	11.5	11.5	11.0
25	12.0	9.0	18.0	15.0	18.5	15.0	17.5	15.5	13.0	11.5	12.0	11.0
26	11.5	8.5	17.5	14.0	18.5	14.5	17.0	15.5	14.0	11.5	12.0	12.0
27	12.5	9.0	17.5	14.0	19.0	16.0	16.5	15.5	17.5	14.0	12.0	12.0
28	12.5	9.5	18.0	14.0	19.0	16.5	16.5	15.0	18.0	17.0	12.0	11.0
29	11.0	8.0	17.5	14.0	18.0	15.5	16.5	14.5	17.0	16.0	11.5	11.0
30	12.5	9.0	15.5	12.5	15.5	13.0	16.5	15.0	16.0	13.5	11.0	11.0
31	---	---	15.5	13.0	---	---	18.0	15.0	16.0	14.0	---	---
MONTH	13.0	4.0	18.5	8.0	19.0	12.0	22.5	12.0	18.0	11.5	16.5	11.0

04128500 INDIAN RIVER AT INDIAN RIVER, MI

LOCATION.--Lat 45°24'38", long 84°37'12", in NE¼ SW¼ sec.24, T.35 N., R.3 W., Cheboygan County, Hydrologic Unit 04070004, on left bank in Indian River, 500 ft (152 m) downstream from Burt Lake, and 2.3 mi (3.7 km) upstream from Mullett Lake.

DRAINAGE AREA. -583 mi² (1,510 km²).

PERIOD OF RECORD.--April 1942 to current year.

REVISED RECORDS.--WSP 1437: 1942(M), 1945(M), 1947.

GAGE.--Water-stage recorder. Datum of gage is 590.21 ft (179.896 m) above mean sea level (levels by Michigan Department of Natural Resources). Prior to Nov. 12, 1942, nonrecording gage at site 100 ft (30 m) downstream. Auxiliary water-stage recorder 14.3 mi (23.0 km) downstream from base gage, near Cheboygan, datum of gage is 591.21 ft (180.201 m) above mean sea level.

REMARKS.--Records good. Flow regulated by dam at Cheboygan. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 567 ft³/s (16.06 m³/s), 13.21 in/yr (336 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 1,220 ft³/s (34.6 m³/s) May 7, 1972; maximum daily gage height, 5.58 ft (1.701 m) May 13, 14, 1960; minimum daily discharge, 212 ft³/s (6.00 m³/s) Sept. 2, 1970; minimum daily gage height, 3.34 ft (1.018 m) Oct. 21, 1957.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 1,030 ft³/s (29.2 m³/s) Apr. 19; maximum daily gage height, 4.64 ft (1.414 m) Apr. 16, 22; minimum daily discharge, 305 ft³/s (8.64 m³/s) July 1; minimum daily gage height, 3.36 ft (1.024 m) Feb. 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	334	445	599	554	497	540	799	870	486	305	393	556
2	343	448	610	556	499	543	835	872	493	324	391	568
3	348	462	614	557	499	540	860	862	457	315	380	569
4	348	469	605	553	499	541	885	851	439	340	374	562
5	368	431	598	546	501	541	913	861	444	340	364	584
6	385	441	598	536	499	545	914	873	470	357	369	570
7	381	461	597	536	493	546	920	835	453	376	362	580
8	377	435	595	523	495	546	922	847	436	374	366	560
9	387	425	593	528	490	541	930	809	431	390	353	507
10	386	452	589	524	493	537	930	778	418	381	338	553
11	385	463	586	518	491	537	934	756	415	370	339	527
12	374	475	589	516	499	535	947	721	425	365	310	528
13	384	473	586	514	498	531	967	716	420	364	313	538
14	378	484	579	513	494	528	976	698	419	358	331	542
15	388	492	581	511	491	530	982	691	417	357	321	543
16	387	499	580	505	491	542	996	674	405	375	320	545
17	384	500	578	504	488	555	1010	649	384	379	346	564
18	378	520	578	503	482	560	1010	631	360	389	338	579
19	371	539	576	504	482	567	1030	621	353	396	347	586
20	370	544	576	503	483	570	1020	618	363	392	359	608
21	381	556	572	504	482	577	1020	618	352	425	356	604
22	395	566	571	501	480	592	1010	604	348	420	365	610
23	388	560	570	494	483	596	998	577	342	422	380	613
24	396	555	560	490	486	610	998	592	336	433	380	620
25	397	563	561	487	484	613	991	607	343	479	386	636
26	410	578	561	488	509	625	964	591	331	473	370	656
27	402	587	561	503	523	637	922	563	327	435	353	680
28	365	589	562	502	530	671	926	546	316	414	352	693
29	386	606	562	500	---	694	891	523	330	417	400	678
30	420	606	553	495	---	747	880	512	313	415	449	695
31	446	---	552	497	---	777	---	500	---	381	477	---
TOTAL	11842	15224	17991	15965	13841	18014	28380	21466	11826	11961	11282	17654
MEAN	382	507	580	515	494	581	946	692	394	386	364	588
MAX	446	606	614	557	530	777	1030	873	493	479	477	695
MIN	334	425	552	487	480	528	799	500	313	305	310	507
CFSM	.66	.87	1.00	.88	.85	1.00	1.62	1.19	.68	.66	.62	1.01
IN.	.76	.97	1.15	1.02	.88	1.15	1.81	1.37	.75	.76	.72	1.13

CAL YR 1976 TOTAL 224756 MEAN 614 MAX 1170 MIN 324 CFSM 1.05 IN 14.34
WTR YR 1977 TOTAL 195446 MEAN 535 MAX 1030 MIN 305 CFSM .92 IN 12.47

04129000 PIGEON RIVER NEAR VANDERBILT, MI

LOCATION.--Lat 45°10'15", long 84°26'18", in SE¼ SW¼ sec.9, T.32 N., R.1 W., Otsego County, Hydrologic Unit 04070004, on right bank at Pigeon River Headquarters, 11.1 mi (17.9 km) east of Vanderbilt, and 26 mi (41.8 km) upstream from Mullett Lake.

DRAINAGE AREA.--63 mi² (160 km²), approximately.

PERIOD OF RECORD.--September 1950 to current year.

GAGE.--Water-stage recorder. Datum of gage is 886.24 ft (270.126 m) above mean sea level.

REMARKS.--Records good except those for the winter period, which are fair. Prior to May 16, 1957, and since Apr. 22, 1958, occasional regulation by Lansing Club Dam, 3.5 mi (5.6 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--27 years, 78.0 ft³/s (2.209 m³/s), 16.81 in/yr (427 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft³/s (42.5 m³/s) May 15, 1957, gage height, 6.80 ft (2.073 m), from floodmark, from rating curve extended above 500 ft³/s (14.2 m³/s), result of failure of Lansing Club Dam; minimum, 13 ft³/s (0.37 m³/s) Jan. 8, 1957.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 378 ft³/s (10.7 m³/s) Mar. 30, gage height, 4.74 ft (1.445 m); minimum, 29 ft³/s (0.82 m³/s) Sept. 30, gage height, 1.84 ft (0.561 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	64	92	80	67	67	83	141	72	65	53	70	72
2	64	83	78	68	67	90	116	79	66	55	83	69
3	60	75	76	69	66	82	133	72	63	55	96	64
4	64	74	76	70	66	79	118	68	60	57	67	64
5	66	83	76	70	67	84	120	82	63	54	64	71
6	71	82	78	70	67	78	96	83	78	56	69	69
7	73	74	75	68	68	78	96	77	78	106	66	78
8	68	74	73	67	69	76	94	69	65	113	70	74
9	70	72	72	64	71	91	90	69	65	75	66	66
10	66	69	70	66	75	115	111	73	61	67	123	62
11	64	73	69	68	79	112	146	68	61	58	86	66
12	66	70	68	70	83	145	157	69	63	63	73	59
13	67	71	68	72	84	192	133	69	60	64	63	90
14	71	71	69	73	84	167	118	66	59	59	65	86
15	71	73	70	74	80	177	99	64	55	59	61	72
16	74	71	69	74	78	202	96	65	58	55	111	71
17	68	69	68	76	78	155	96	65	57	78	118	91
18	72	72	68	76	78	122	94	68	57	76	85	74
19	70	74	68	75	78	111	90	63	55	69	77	77
20	70	77	68	74	76	101	92	66	62	59	77	129
21	72	74	68	74	72	99	95	64	64	57	71	98
22	82	70	68	73	61	102	90	63	56	54	81	84
23	90	72	68	73	80	92	92	62	55	54	75	83
24	76	73	68	72	90	96	84	63	58	54	66	88
25	76	71	67	70	100	87	82	57	55	66	63	172
26	77	77	66	69	90	87	78	60	53	59	68	124
27	69	81	66	68	75	103	73	59	53	54	63	147
28	69	79	65	68	96	177	75	58	53	52	63	105
29	68	71	64	67	---	244	78	56	53	58	101	86
30	68	74	66	67	---	262	72	58	53	55	80	81
31	106	---	66	67	---	179	---	62	---	72	68	---
TOTAL	2212	2241	2171	2179	2145	3868	3055	2069	1804	1966	2381	2572
MEAN	71.4	74.7	70.0	70.3	76.6	125	102	66.7	60.1	63.4	76.8	85.7
MAX	106	92	80	76	100	262	157	83	78	113	123	172
MIN	60	69	64	64	61	76	72	56	53	52	60	59
CFSM	1.13	1.19	1.11	1.12	1.22	1.98	1.62	1.06	.95	1.01	1.22	1.36
IN.	1.31	1.32	1.28	1.29	1.27	2.28	1.80	1.22	1.07	1.16	1.41	1.52

CAL YR 1976 TOTAL 31686 MEAN 86.6 MAX 311 MIN 57 CFSM 1.38 IN 18.71
WTR YR 1977 TOTAL 28663 MEAN 78.5 MAX 262 MIN 52 CFSM 1.25 IN 16.92

04129500 PIGEON RIVER AT AFTON, MI

LOCATION.--Lat 45°22'26", long 84°30'54", in NW¼ NE¼ sec.2, T.34 N., R.2 W., Cheboygan County, Hydrologic Unit 04070004, on downstream side of bridge on State Highway 68, 0.9 mi (1.4 km) west of Afton, 2.2 mi (3.5 km) downstream from Wilkes Creek, and 7 mi (11 km) upstream from Mullett Lake.

DRAINAGE AREA.--159 mi² (412 km²).

PERIOD OF RECORD.--April 1942 to current year.

REVISED RECORDS.--WSP 1437: 1945-46, 1950.

GAGE.--Nonrecording gage. Altitude of gage 675 ft (206 m), by barometer. Prior to Oct. 1, 1961, at various sites upstream at present datum.

REMARKS.--Records poor. Prior to May 16, 1957, and since Apr. 22, 1958, occasional regulation by Lansing Club Dam 22 mi (35 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 140 ft³/s (3.965 m³/s), 11.96 in/yr (304 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,170 ft³/s (33.1 m³/s) Apr. 17, 1960, gage height, 6.80 ft (2.073 m), from high-water mark; maximum gage height, about 10.5 ft (3.20 m) Mar. 31, 1943, from floodmarks, backwater from ice; minimum discharge, 49 ft³/s (1.39 m³/s) Aug. 8, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 646 ft³/s (18.3 m³/s) Mar. 30, gage height, 6.22 ft (1.896 m); maximum gage height, 6.96 ft (2.121 m) Mar. 14, backwater from ice; minimum discharge, 62 ft³/s (1.76 m³/s) June 13, gage height, 4.28 ft (1.305 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	99	169	110	80	72	130	359	129	95	83	116	124
2	97	153	130	81	72	130	288	142	100	79	109	118
3	95	142	145	82	72	135	265	142	101	85	140	114
4	93	137	155	82	72	140	270	131	97	85	124	101
5	97	135	160	82	72	145	250	142	97	79	118	101
6	105	140	145	82	72	150	250	162	114	79	109	116
7	109	135	130	82	72	160	221	153	126	101	97	126
8	109	133	125	81	72	170	208	137	118	162	105	124
9	107	126	120	80	73	185	248	129	89	151	109	110
10	107	126	115	80	75	220	270	124	99	118	144	100
11	105	116	110	79	80	270	282	122	75	99	179	96
12	105	120	105	78	84	340	285	122	72	89	135	99
13	103	122	105	78	88	420	282	120	72	101	107	92
14	107	120	100	78	92	460	256	120	83	91	95	140
15	116	114	100	78	93	410	221	124	85	87	83	130
16	118	114	98	78	93	360	198	114	85	83	120	114
17	116	116	96	78	92	310	186	112	87	91	169	135
18	114	114	95	78	91	279	181	112	81	116	160	140
19	114	114	94	78	91	230	181	116	85	103	133	140
20	114	116	92	78	90	206	186	112	89	95	135	196
21	120	120	90	78	92	189	186	118	95	85	124	232
22	126	118	90	76	94	196	184	109	89	81	126	194
23	137	116	88	76	100	186	177	109	91	73	124	162
24	140	122	88	74	105	167	165	103	85	79	114	153
25	126	120	86	73	115	174	156	105	85	85	103	214
26	129	116	84	73	120	158	153	95	81	85	99	279
27	120	124	82	72	125	179	146	93	77	81	89	246
28	118	115	81	72	130	320	140	93	75	73	105	227
29	120	100	80	72	---	545	137	90	75	81	153	196
30	122	96	80	72	---	625	135	88	77	79	172	174
31	149	---	80	72	---	500	---	91	---	95	137	---
TOTAL	3539	3789	3259	2403	2499	8089	6466	3659	2680	2874	3833	4493
MEAN	114	124	105	77.5	89.3	261	216	118	89.3	92.7	124	150
MAX	149	169	160	82	130	625	359	162	126	162	179	279
MIN	93	96	80	72	72	130	135	88	72	73	83	92
CFSM	.72	.78	.66	.49	.56	1.64	1.36	.74	.56	.58	.78	.94
IN.	.83	.87	.76	.56	.58	1.89	1.51	.86	.63	.67	.90	1.05

CAL YR 1976 TOTAL 59128 MEAN 162 MAX 720 MIN 80 CFSM 1.02 IN 13.83
WTR YR 1977 TOTAL 47503 MEAN 130 MAX 625 MIN 72 CFSM .82 IN 11.11

04130000 CHEBOYGAN RIVER NEAR CHEBOYGAN, MI

LOCATION.--Lat 45°34'38", long 84°29'15", in SW¼ sec.19, T.37 N., R.1 W., Cheboygan County, Hydrologic Unit 04070004, on right bank 300 ft (91 m) downstream from Millett Lake, 2.4 mi (3.9 km) upstream from Black River, and 4.8 mi (7.7 km) south of Cheboygan.

DRAINAGE AREA.--865 mi² (2,240 km²).

PERIOD OF RECORD.--October 1942 to current year. Monthly discharge only for October 1942, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 591.21 ft (180.201 m) above mean sea level. Auxiliary water-stage recorder 5.1 mi (8.2 km) downstream from base gage, in Cheboygan, datum of gage is 590.00 ft (179.832 m) above mean sea level. Prior to Aug. 30, 1967, nonrecording auxiliary gage in Cheboygan, 5.2 mi (8.4 km) downstream at present datum.

REMARKS.--Water-discharge record fair. Flow regulated by dam in Cheboygan; prior to Dec. 31, 1965, flow affected by variable backwater from powerplant in Cheboygan 5.2 mi (8.4 km) below station and by Alverno powerplant.

AVERAGE DISCHARGE.--35 years, 815 ft³/s (23.08 m³/s), 12.80 in/yr (325 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 1,640 ft³/s (46.4 m³/s) May 8, 1959; maximum daily gage height, 3.27 ft (0.997 m) May 13, 14, 1960; minimum daily discharge, 90 ft³/s (2.55 m³/s) Mar. 29, 30, 1958; minimum daily gage height, 1.05 ft (0.320 m) Apr. 13, 14, 15, 1975.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 1,610 ft³/s (45.6 m³/s) Apr. 13; maximum daily gage height, 2.65 ft (0.808 m) Aug. 29; minimum daily discharge, 363 ft³/s (10.3 m³/s) June 18; minimum daily gage height, 1.41 ft (0.430 m) Mar. 2.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	624	552	900	850	680	1060	1590	990	531	381	424	1170
2	625	544	920	850	673	1040	1570	1000	557	401	429	1130
3	624	520	940	840	672	938	1560	1010	530	393	421	1040
4	606	419	930	830	676	934	1560	1040	511	398	426	995
5	620	400	930	797	679	919	1570	1130	519	409	419	1040
6	637	449	924	770	683	916	1570	1100	530	399	436	961
7	639	479	935	775	680	911	1580	956	521	401	430	850
8	627	485	935	770	673	893	1590	970	509	386	433	868
9	634	492	936	772	671	873	1600	961	508	401	440	846
10	635	551	938	779	675	859	1590	951	491	392	420	849
11	606	600	939	751	674	858	1580	809	487	395	413	853
12	542	619	949	736	665	834	1600	632	506	395	403	857
13	548	633	959	729	653	782	1610	624	506	371	403	860
14	572	650	941	718	649	809	1600	641	504	373	432	894
15	564	672	947	701	652	880	1560	661	500	410	433	975
16	594	691	949	697	649	953	1560	652	438	446	436	979
17	585	703	944	690	647	1110	1570	635	375	443	457	999
18	578	729	940	685	644	1130	1580	647	363	452	545	1070
19	575	752	930	671	647	1150	1580	651	389	459	548	1090
20	571	774	920	664	647	1160	1490	726	404	451	557	1080
21	576	792	920	664	645	1200	1390	708	394	474	557	1080
22	596	802	910	666	647	1310	1250	709	392	516	567	1080
23	596	781	903	658	652	1340	1250	698	389	572	568	1080
24	612	783	894	658	639	1400	1260	705	382	580	581	1090
25	613	791	880	664	709	1420	1270	713	382	616	587	1060
26	620	807	880	657	985	1500	1220	684	374	590	531	1060
27	610	823	880	666	1060	1510	951	603	374	477	437	1110
28	544	827	880	670	1060	1470	979	568	370	416	424	1120
29	516	848	880	669	---	1560	995	555	403	426	657	1110
30	529	880	880	670	---	1580	993	549	393	431	1010	1070
31	539	---	870	670	---	1600	---	539	---	404	1060	---
TOTAL	18357	19848	28483	22387	19686	34899	43068	23817	13532	13658	15884	30266
MEAN	592	662	919	722	703	1126	1436	768	451	441	512	1009
MAX	639	880	959	850	1060	1600	1610	1130	557	616	1060	1170
MIN	516	400	870	657	639	782	951	539	363	371	403	846
CFSM	.68	.77	1.06	.84	.81	1.30	1.66	.89	.52	.51	.59	1.17
IN.	.79	.85	1.22	.96	.85	1.50	1.85	1.02	.58	.59	.68	1.30

CAL YR 1976 TOTAL 323522 MEAN 884 MAX 1630 MIN 480 CFSM 1.02 IN 13.91
WTR YR 1977 TOTAL 283885 MEAN 778 MAX 1610 MIN 363 CFSM .90 IN 12.21

04130500 BLACK RIVER NEAR TOWER, MI

LOCATION.--Lat 45°23'33", long 84°20'00", in SE¼ NE¼ sec.29, T.35 N., R.1 E., Cheboygan County, Hydrologic Unit 04070005, on right bank 400 ft (122 m) downstream from Kleber Dam, 1,000 ft (305 m) upstream from Milligan Creek, 3.0 mi (4.8 km) northwest of Tower, and 10.8 mi (17.4 km) upstream from Black Lake.

DRAINAGE AREA.--313 mi² (811 km²).

PERIOD OF RECORD.--October 1942 to current year. Monthly discharge only for October 1942, published in WSP 1307.

REVISED RECORDS.--WSP 1307: 1942.

GAGE.--Water-stage recorder. Datum of gage is 658.00 ft (200.558 m) above mean sea level (Stanley Engineering Co. bench mark). Prior to Aug. 1, 1949, at site 1 mi (1.6 km) upstream at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by hydroelectric powerplant 400 ft (122 m) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 269 ft³/s (7.618 m³/s), 11.67 in/yr (296 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,340 ft³/s (66.3 m³/s) Apr. 17, 1960, gage height, 7.13 ft (2.173 m); minimum, 0.60 ft³/s (0.017 m³/s) Mar. 11, 1950; minimum daily, 4.0 ft³/s (0.11 m³/s) Nov. 27, 1949.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,140 ft³/s (32.3 m³/s) Mar. 16, gage height, 4.98 ft (1.518 m); minimum, 28 ft³/s (0.79 m³/s) June 27, gage height, 1.43 ft (0.436 m); minimum daily, 130 ft³/s (3.68 m³/s) July 5, 30, 31.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	194	240	144	169	312	201	762	256	158	146	160	250
2	194	310	149	254	185	253	691	279	165	137	213	250
3	180	412	150	221	185	290	625	290	168	141	199	203
4	173	250	177	200	185	253	582	255	168	133	200	178
5	173	250	244	199	190	253	517	257	166	130	228	178
6	175	250	243	200	189	253	501	290	194	132	200	180
7	175	250	241	198	185	228	500	293	223	153	201	203
8	198	250	195	195	182	246	376	260	193	215	201	254
9	203	250	196	195	178	302	272	260	193	260	202	253
10	201	245	139	195	176	311	420	260	192	242	240	253
11	196	245	169	195	198	433	462	235	188	198	275	235
12	200	243	204	195	250	489	501	236	180	175	306	203
13	204	190	250	195	250	522	501	232	157	168	254	203
14	240	200	250	195	250	553	501	233	155	150	204	233
15	175	228	245	195	250	784	501	229	154	149	178	325
16	200	228	194	195	248	1030	501	225	153	141	179	253
17	203	226	197	190	248	673	374	177	153	150	246	267
18	276	227	201	190	178	646	363	185	153	152	309	245
19	203	225	216	190	178	634	428	255	155	175	290	273
20	226	201	255	190	180	533	380	194	153	174	313	333
21	230	190	255	171	182	496	464	187	152	176	289	417
22	228	191	192	151	180	465	436	185	180	159	281	384
23	200	215	204	161	205	279	437	185	184	148	240	270
24	228	228	177	176	253	403	276	206	192	149	242	241
25	278	228	174	199	253	359	201	206	159	151	194	422
26	228	228	197	203	253	279	325	206	148	153	196	463
27	289	228	255	173	253	325	314	204	145	150	198	650
28	218	234	255	174	180	526	329	158	147	139	180	586
29	240	216	193	174	---	656	254	183	150	131	182	547
30	213	157	164	174	---	794	256	159	149	130	322	505
31	213	---	169	246	---	807	---	154	---	130	262	---
TOTAL	6554	7035	6294	5958	5956	14276	13050	6934	5027	4937	7184	9257
MEAN	211	235	203	192	213	461	435	224	168	159	232	309
MAX	289	412	255	254	312	1030	762	293	223	260	322	650
MIN	173	157	139	151	176	201	201	154	145	130	160	178
CFSM	.67	.75	.65	.61	.68	1.47	1.39	.72	.54	.51	.74	.99
IN.	.78	.84	.75	.71	.71	1.70	1.55	.82	.60	.59	.85	1.10

CAL YR 1976 TOTAL 117080 MEAN 320 MAX 1500 MIN 136 CFSM 1.02 IN 13.91
WTR YR 1977 TOTAL 92462 MEAN 253 MAX 1030 MIN 130 CFSM .81 IN 10.99

04131500 RAINY RIVER NEAR OCQUEOC, MI

LOCATION.--Lat 45°24'30", long 84°10'45", in NE¼ NW¼ sec.22, T.35 N., R.2 E., Presque Isle County, Hydrologic Unit 04070005, on upstream side of highway bridge, 4.4 mi (7.1 km) west of Ocqueoc, and 5 mi (8 km) upstream from Black Lake.

DRAINAGE AREA.--85 mi² (220 km²), approximately.

PERIOD OF RECORD.--October 1952 to current year.

GAGE.--Nonrecording gage. Datum of gage is 674.85 ft (205.694 m) above mean sea level, unadjusted.

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 41.3 ft³/s (1.170 m³/s), 6.60 in/yr (168 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 946 ft³/s (26.8 m³/s) Apr. 18, 1960, gage height, 6.33 ft (1.929 m), from floodmark; minimum, 0.4 ft³/s (0.011 m³/s) Sept. 7, 1955.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 193 ft³/s (5.47 m³/s) Mar. 30, gage height, 3.45 ft (1.052 m); minimum, 1.7 ft³/s (.048 m³/s) Oct. 3; minimum gage height, 1.32 ft (0.402 m) July 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.8	5.3	3.8	2.6	2.9	5.2	148	30	5.4	3.2	3.2	9.3
2	1.8	5.3	3.6	2.6	2.9	5.4	136	24	6.1	2.8	3.2	7.9
3	1.8	4.7	3.5	2.6	2.9	5.6	127	22	5.4	3.4	3.2	7.0
4	1.8	4.2	3.4	2.6	2.9	5.8	116	22	5.3	3.9	2.9	6.7
5	1.8	4.2	3.3	2.6	2.9	6.1	108	24	5.3	3.5	2.6	6.7
6	2.0	4.4	3.2	2.6	2.8	7.0	102	29	7.0	3.6	2.8	7.0
7	2.1	4.4	3.1	2.6	2.9	10	87	27	7.6	4.9	2.8	12
8	2.2	4.5	3.1	2.6	3.0	17	76	24	7.3	4.5	2.6	15
9	2.2	4.4	3.1	2.5	3.2	30	69	20	7.0	3.6	2.7	13
10	2.2	4.2	3.1	2.5	3.4	45	81	18	6.4	3.2	6.7	11
11	2.2	4.0	3.1	2.5	3.5	60	87	16	5.4	2.8	7.6	7.9
12	2.2	4.0	3.1	2.6	3.5	80	95	16	4.0	2.7	4.0	7.9
13	2.2	3.9	3.0	2.6	3.5	108	91	15	3.5	2.9	3.6	13
14	2.5	3.6	3.0	2.6	3.4	134	90	13	4.4	2.9	3.0	18
15	2.6	3.5	3.1	2.6	3.3	119	80	12	3.8	2.7	2.8	19
16	2.9	3.6	3.1	2.6	3.3	116	69	12	3.3	2.6	5.6	20
17	3.2	3.9	3.1	2.7	3.3	147	64	11	3.2	2.6	7.6	22
18	2.9	3.9	3.0	2.7	3.4	136	62	9.3	3.2	2.5	6.1	24
19	2.8	3.9	2.9	2.8	3.5	104	64	8.2	3.0	2.4	5.8	24
20	3.0	4.0	2.9	2.8	3.7	86	74	9.7	3.2	2.4	6.1	30
21	3.4	3.9	2.8	2.8	3.9	74	82	22	3.3	2.4	9.3	41
22	3.8	3.8	2.8	2.8	4.1	69	79	31	3.2	2.3	7.6	43
23	4.2	3.9	2.7	2.8	4.2	65	68	27	3.0	2.3	7.9	37
24	4.2	4.0	2.7	2.8	4.3	64	61	21	2.9	2.4	7.3	35
25	4.0	4.0	2.7	2.8	4.5	67	53	15	2.9	2.6	5.4	70
26	3.8	3.9	2.6	2.8	4.7	66	45	12	2.8	2.6	4.4	100
27	3.6	3.9	2.6	2.8	4.9	91	38	8.8	2.8	2.4	4.2	110
28	3.5	4.0	2.6	2.7	5.1	122	35	7.6	2.8	2.2	4.0	102
29	3.5	4.0	2.5	2.8	---	140	33	6.4	2.8	2.3	9.3	96
30	4.0	3.9	2.5	2.8	---	179	28	5.4	3.2	2.5	12	91
31	5.3	---	2.5	2.8	---	179	---	4.9	---	3.5	9.3	---
TOTAL	89.5	123.2	92.5	83.0	99.9	2343.1	2348	523.3	129.5	90.6	165.6	1006.4
MEAN	2.89	4.11	2.98	2.68	3.57	75.6	78.3	16.9	4.32	2.92	5.34	33.5
MAX	5.3	5.3	3.8	2.8	5.1	179	148	31	7.6	4.9	12	110
MIN	1.8	3.5	2.5	2.5	2.8	5.2	28	4.9	2.8	2.2	2.6	6.7
CFSM	.03	.05	.04	.03	.04	.89	.92	.20	.05	.03	.06	.39
IN.	.04	.05	.04	.04	.04	1.03	1.03	.23	.06	.04	.07	.44

CAL YR 1976 TOTAL 15056.6 MEAN 41.1 MAX 727 MIN 1.2 CFSM .48 IN 6.59
WTR YR 1977 TOTAL 7094.6 MEAN 19.4 MAX 179 MIN 1.8 CFSM .23 IN 3.10

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°38'02", long 84°28'52", in NW¼ NE¼ sec.6, T.37 N., R.1 W., Cheboygan County, Hydrologic Unit 04070004, at upstream side of bridge on Lincoln Avenue in Cheboygan, 1.75 mi (2.8 km) upstream from mouth.

DRAINAGE AREA.--1,500 mi² (3,900 km²), approximately.

PERIOD OF RECORD.--October 1974 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to current year.
WATER TEMPERATURES: October 1974 to current year.

INSTRUMENTATION.--Water quality monitor since October 1976.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument. Flow regulated by dam 1,000 ft (305 m) downstream.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum observed, 900 micromhos Apr. 24, 1975; minimum observed, 140 micromhos Mar. 8, 1975.
WATER TEMPERATURES (water years 1976 and 1977): Maximum, 27.0°C July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 336 micromhos Mar. 11, 12; minimum, 262 micromhos Aug. 31.
WATER TEMPERATURES: Maximum, 27.0°C July 20; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UM-MF (COL./ 100 ML)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)
OCT												
06...	0900	600	290	8.0	13.5	10.0	97	530	--	--	160	0
26...	1015	690	290	8.1	6.5	11.5	95	730	83	16	160	0
NOV												
29...	1605	1570	310	8.4	.5	13.4	95	28	89	18	160	6
JAN												
06...	1245	930	330	7.8	.0	14.3	100	247	200	84	170	0
FEB												
01...	1350	1020	300	8.1	.0	13.5	94	340	123	14	--	--
MAR												
01...	1300	1550	333	8.1	.0	13.5	94	48	B11	82	170	0
31...	1030	2660	277	7.7	2.5	13.4	98	B32	87	36	140	4
MAY												
05...	0900	1340	300	8.0	12.0	11.2	107	260	112	B36	170	3
JUN												
09...	1150	731	289	8.3	17.0	10.1	105	74	195	68	160	1
JUL												
13...	1435	756	302	8.4	22.5	8.6	100	.90	21	35	160	11
AUG												
11...	1000	410	280	8.2	21.5	8.0	94	170	B16	25	150	12
SEP												
15...	1100	1350	333	8.0	14.0	10.1	99	96	110	44	160	14

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
OCT												
06...	42	13	3.3	.1	.8	202	0	166	3.2	7.6	4.7	.2
26...	43	13	3.3	.1	.8	198	0	162	2.5	9.4	4.1	.2
NOV												
29...	44	13	3.4	.1	.9	176	8	158	1.2	11	5.5	.2
JAN												
06...	45	14	3.5	.1	.8	208	0	171	5.3	8.8	4.8	.1
FEB												
01...	--	13	3.3	--	.8	206	0	169	2.6	8.2	4.9	.2
MAR												
01...	46	14	3.8	.1	.8	212	0	174	2.7	11	4.8	.2
31...	38	11	3.1	.1	.9	166	0	140	5.3	11	4.8	.2
MAY												
05...	45	13	3.2	.1	1.0	198	0	160	3.2	13	3.7	.2
JUN												
09...	43	12	3.6	.1	.8	190	0	160	1.5	12	4.2	.1
JUL												
13...	42	13	4.0	.1	.8	176	2	150	1.1	8.3	4.5	.1
AUG												
11...	40	13	3.9	.1	1.0	172	0	140	1.7	12	4.7	.1
SEP												
15...	44	12	3.4	.1	.9	178	0	146	2.8	12	4.5	.1

B--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	SUS-PENDED SEDI-MENT (MG/L)	SUS-PENDED SEDI-MENT DIS-CHARGE (T/DAY)	SUS. SED. SIEVE DIAM. % FINER THAN .062 MM
OCT											
06...	6.5	166	178	269	.02	.27	1.2	.04	3	4.9	100
26...	6.8	175	178	326	.03	.26	1.2	.05	2	3.7	100
NOV											
29...	7.0	176	180	746	.05	.35	1.6	.03	--	--	--
JAN											
06...	7.1	183	187	460	.04	.22	.97	.02	6	15	100
FEB											
01...	6.6	184	--	507	.05	.88	3.9	.02	4	11	100
MAR											
01...	7.0	187	192	783	.08	.56	2.5	.03	1	4.2	100
31...	5.7	--	157	--	.17	.77	3.4	.01	9	65	100
MAY											
05...	6.3	181	183	655	.05	.31	1.4	.01	4	14	100
JUN											
09...	6.3	176	176	347	.04	.35	1.6	.01	1	2.0	100
JUL											
13...	6.6	174	168	355	.01	.41	1.8	.01	3	6.1	100
AUG											
11...	6.7	174	166	193	.01	.38	1.7	.05	1	1.1	100
SEP											
15...	9.7	176	174	642	.01	.26	1.2	.01	2	7.3	100

DATE	TIME	TOTAL ARSENIC (AS) (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	TOTAL CAD-MIUM (CD) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	TOTAL CHRO-MIUM (CR) (UG/L)	DIS-SOLVED CHRO-MIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	TOTAL IRON (FE) (UG/L)
OCT												
06...	0900	0	0	1	1	10	10	3	3	0	0	50
JAN												
06...	1245	1	0	1	1	<10	<10	0	0	0	0	30
MAR												
31...	1030	0	0	1	0	<10	<10	1	0	--	10	170
JUL												
13...	1435	2	0	0	0	10	1	0	0	2	0	70

DATE	DIS-SOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	TOTAL MAN-GANESE (MN) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	TOTAL SELE-NIUM (SE) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	TOTAL ZINC (ZN) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	TOTAL ORGANIC CARBON (C) (MG/L)
OCT												
06...	20	12	4	10	0	<.5	<.5	0	0	10	10	7.0
JAN												
06...	0	6	5	0	0	<.5	<.5	0	0	20	10	4.8
MAR												
31...	20	10	4	0	0	<.5	<.5	2	2	20	10	--
JUL												
13...	60	3	3	10	0	.0	.0	0	0	0	0	3.0

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	TOTAL ALDRIN (UG/L)	ALDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ATRAZINE (UG/L)	TOTAL CHLORDANE (UG/L)	CHLORDANE IN BOTTOM MATERIAL (UG/KG)	TOTAL DDD (UG/L)	TOTAL DDE (UG/L)	TOTAL DDT (UG/L)	TOTAL DIAZINON (UG/L)	DIAZINON IN BOTTOM MATERIAL (UG/KG)
FEB											
01...	1350	ND	--	ND	ND	--	ND	ND	ND	ND	--
MAY											
05...	0900	ND	ND	ND	ND	ND	ND	ND	ND	--	ND
AUG											
11...	1000	ND	--	ND	ND	--	ND	ND	ND	ND	--

DATE	TOTAL DIELDRIN (UG/L)	DIELDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ENDRIN (UG/L)	ENDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ETHION (UG/L)	ETHION IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR (UG/L)	HEPTACHLOR IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR EPOXIDE (UG/L)	HEPTACHLOR EPOXIDE IN BOTTOM MATERIAL (UG/KG)
FEB										
01...	ND	--	ND	--	ND	--	ND	--	ND	--
MAY										
05...	ND	ND	ND	ND	--	ND	ND	ND	ND	ND
AUG										
11...	ND	--	ND	--	ND	--	ND	--	ND	--

DATE	TOTAL LINDANE (UG/L)	LINDANE IN BOTTOM MATERIAL (UG/KG)	TOTAL MALATHION (UG/L)	MALATHION IN BOTTOM MATERIAL (UG/KG)	TOTAL METHOXYCHLOR (UG/L)	METHOXYCHLOR IN BOTTOM MATERIAL (UG/KG)	TOTAL METHYL PARATHION (UG/L)	METHYL PARATHION IN BOTTOM MATERIAL (UG/KG)	TOTAL METHYL TRITHION (UG/L)	METHYL TRITHION IN BOTTOM MATERIAL (UG/KG)
FEB										
01...	ND	--	ND	--	ND	--	ND	--	ND	--
MAY										
05...	ND	.0	--	ND	ND	ND	--	ND	--	ND
AUG										
11...	ND	--	ND	--	ND	--	ND	--	ND	--

DATE	TOTAL PARATHION (UG/L)	PARATHION IN BOTTOM MATERIAL (UG/KG)	SIMAZINE TOTAL COULSON COND. (UG/L)	TOTAL TOXAPHENE (UG/L)	TOXAPHENE IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	TRITHION IN BOTTOM MATERIAL (UG/KG)	TOTAL 2,4-D (UG/L)	TOTAL 2,4,5-T (UG/L)	TOTAL SILVEX (UG/L)
FEB										
01...	ND	--	ND	ND	--	ND	--	ND	ND	ND
MAY										
05...	--	ND	ND	ND	ND	--	ND	ND	ND	ND
AUG										
11...	ND	--	ND	ND	--	ND	--	ND	ND	ND

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

PERIPHYTON

DATE	LENGTH OF EXPOSURE (DAYS)	BIOMASS CHLOROPHYLL RATIO PERIPHYTON (UNITS)	CHLOR-A PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)	CHLOR-B PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)
OCT				
26...	20	4564	--	--
FEB				
01...	26	144	--	--
MAY				
05...	35	13910	.080	.000
AUG				
11...	29	52560	.009	.002

ND--NOT DETECTED

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	OCT 6,76		OCT 26,76		NOV 29,76		JAN 6,77		FEB 1,77		MAR 1,77	
TIME	0900		1015		1605		1245		1350		1300	
TOTAL CELLS/ML	4800		3400		950		520		66		200	
DIVERSITY: DIVISION	0.6		0.6		1.2		1.7		1.2		1.2	
.CLASS	0.6		1.1		1.3		1.7		1.8		1.9	
..ORDER	0.6		1.2		1.6		2.2		2.4		2.2	
...FAMILY	0.7		1.2		1.8		2.4		2.6		2.9	
....GENUS	0.7		1.2		2.1		2.7		2.8		3.1	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)												
.CHLOROPHYCEAE												
..CHLOROCOCCALES												
...OOCYSTACEAE												
....ANKISTRODESMUS	--	-	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	26	5	--	-	--	-
....OOCYSTIS	430	9	--	-	--	-	39	8	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE												
....CRUCIGENIA	--	-	--	-	--	-	7	1	--	-	--	-
....SCENEDESMUS	280	6	--	-	14	2	--	-	16#	24	--	-
..TETRASPORALES												
...COCCOMYXACEAE												
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CHLAMYDOMONAS	--	-	--	-	--	-	92#	18	8	12	16	8
..ZYGNEMATALES												
...DESMIDIACEAE												
....COSMARIUM	--	-	--	-	--	-	--	-	--	-	--	-
...ZYGNEMATACEAE												
....SPIROGYRA	--	-	--	-	--	-	--	-	--	-	6	3
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	4100#	85	2600#	76	560#	59	33	6	--	-	10	5
....MELOSIRA	--	-	--	-	50	5	59	11	8	12	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-	--	-
..PENNALES												
...ACHNANTHACEAE												
....ACHNANTHES	--	-	--	-	--	-	7	1	--	-	19	10
....COCCONEIS	--	-	--	-	--	-	3	1	--	-	--	-
...CYMBELLACEAE												
....AMPHORA	--	-	--	-	7	1	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	7	1	--	-	--	-	3	2
...DIATOMACEAE												
....DIATOMA	--	-	--	-	--	-	--	-	8	12	3	2
...FRAGILARIACEAE												
....ASTERIONELLA	--	-	--	-	--	-	--	-	--	-	23	11
....FRAGILARIA	--	-	--	-	--	-	13	3	--	-	19	10
....SYNEDRA	--	-	--	-	21	2	--	-	--	-	--	-
...GOMPHONEMATACEAE												
....GOMPHONEMA	--	-	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE												
....NAVICULA	--	-	--	-	14	2	--	-	4	6	3	2
....STAURONEIS	--	-	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE												
....NITZSCHIA	--	-	47	1	14	2	13	3	--	-	3	2
...SURIRELLACEAE												
....CYMATOPLEURA	--	-	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...CHROMULINACEAE												
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-	--	-	--	-
...MALLOMONADACEAE												
....MALLOMONAS	--	-	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE												
....DINOBRYON	--	-	350	10	21	2	--	-	4	6	65#	32
....OCHROMONAS	--	-	--	-	--	-	3	1	16#	24	--	-
...SYNURACEAE												
....SYNURA	--	-	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE / TIME	OCT 6,76 0900		OCT 26,76 1015		NOV 29,76 1605		JAN 6,77 1245		FEB 1,77 1350		MAR 1,77 1300	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROCCOCCALES												
...CHROCCOCCACEAE												
....ANACYSTIS	--	-	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES												
...NOSTOCACEAE												
....ANABAENA	*	0	--	-	*	0	--	-	--	-	--	-
....APHANIZOMENON	--	-	--	-	100	11	--	-	*	0	--	-
...OSCILLATORIACEAE												
....OSCILLATORIA	*	0	380	11	*	0	210#	41	--	-	--	-
..CHROCCOCCALES												
...CHROCCOCCACEAE												
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	*	0	--	-
EUGLENOPHYTA (EUGLENOIDS)												
.CRYPTOPHYCEAE												
..CRYPTOMONIDALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	*	0	24	1	140#	15	7	1	--	-	26	13
...CRYPTOMONODACEAE												
....CRYPTOMONAS	--	-	24	1	--	-	--	-	4	6	--	-
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....PHACUS	--	-	--	-	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..GYMNODINIALES												
...GYMNODINIACEAE												
....GYMNODINIUM	--	-	--	-	--	-	--	-	--	-	3	2
..PERIDINIALES												
...GLENODINIACEAE												
....GLENODINIUM	*	.0	--	-	--	-	3	1	--	-	--	-
...PERIDINIACEAE												
....PERIDINIUM	--	-	--	-	--	-	--	-	--	-	--	-

DATE / TIME	MAY 5,77 0900	JUN 9,77 1150	JUL 13,77 1435	AUG 11,77 1000	SEP 15,77 1100
TOTAL CELLS/ML	8500	4400	3900	6400	990
DIVERSITY: DIVISION	0.3	1.0	1.0	0.8	0.5
.CLASS	0.3	1.2	1.4	0.9	0.5
..ORDER	0.8	2.0	1.6	1.1	1.1
...FAMILY	1.2	2.0	2.1	1.2	1.4
....GENUS	1.3	2.1	2.2	1.2	2.1

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...OOCYSTACEAE										
....ANKISTRODESMUS	*	0	*	0	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	*	0	190	5	--	-	10	1
....SELENASTRUM	70	1	*	0	--	-	--	-	--	-
....TETRAEDRON	--	-	*	0	--	-	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	--	-	34	1	76	1	--	-
....SCENEDESMUS	--	-	--	-	120	3	57	1	10	1
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	34	1	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	*	0	42	1	38	1	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....COSMARIUM	--	-	--	-	--	-	*	0	--	-
...ZYGNEMATACEAE										
....SPIROGYRA	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE / TIME	MAY 5,77 0900		JUN 9,77 1150		JUL 13,77 1435		AUG 11,77 1000		SEP 15,77 1100	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	1000	12	620	14	220	6	250	4	14	1
....MELOSIRA	*	0	*	0	*	0	--	-	--	-
....STEPHANODISCUS	--	-	--	-	*	0	*	0	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	*	0	*	0	*	0	--	-	--	-
....COCCONEIS	--	-	--	-	*	0	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	--	-
....CYMBELLA	6500#	77	*	0	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	*	0	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	84	1	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-	--	-
....SYNEDRA	480	6	--	-	25	1	76	1	14	1
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	*	0	*	0	10	1
...NAVICULACEAE										
....NAVICULA	--	-	29	1	--	-	*	0	*	0
....STAURONEIS	*	0	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	67	2	--	-	*	0	*	0
...SURIRELLACEAE										
....CYMATOPLEURA	*	0	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	*	0	--	-	--	-	--	-	--	-
...MALLOMONADACEAE										
....MALLOMONAS	--	-	*	0	--	-	--	-	--	-
...OCHROMONADACEAE										
....DINOBRYON	*	0	--	-	360	9	330	5	*	0
....OCHROMONAS	--	-	400	9	--	-	*	0	--	-
...SYNURACEAE										
....SYNURA	--	-	--	-	2400#	61	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....ANACYSTIS	--	-	1200#	26	370	9	5300#	82	380#	39
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	100	10
....APHANIZOMENON	--	-	--	-	--	-	110	2	--	-
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	2000#	46	--	-	--	-	48	5
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	380#	39
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	84	1	--	-	59	1	94	1	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	*	0	*	0	--	-	--	-	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....PHACUS	--	-	--	-	*	0	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..GYMNODINIALES										
...GYMNODINIACEAE										
....GYMNODINIUM	--	-	--	-	--	-	--	-	--	-
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	84	1	--	-	--	-	--	-	--	-
...PERIDINIACEAE										
....PERIDINIUM	--	-	--	-	--	-	*	0	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	309	305	307	310	305	307	322	315	319
2	---	---	---	309	306	308	309	305	307	323	321	321
3	---	---	---	309	307	308	309	308	309	322	321	321
4	---	---	---	309	307	308	315	308	311	322	320	321
5	---	---	---	309	308	309	316	310	313	322	320	321
6	---	---	---	309	306	307	316	311	314	322	316	320
7	304	299	301	308	307	307	317	310	313	320	314	316
8	305	300	303	307	306	307	312	310	312	317	314	315
9	305	298	302	309	307	308	312	311	311	318	312	315
10	307	300	304	309	308	309	319	312	316	317	315	316
11	307	303	306	309	306	307	314	311	313	323	315	319
12	308	304	306	308	306	307	319	312	315	322	315	318
13	309	306	308	307	306	307	314	311	313	317	315	316
14	310	306	308	308	306	307	320	314	317	322	315	319
15	310	307	308	309	306	307	320	318	319	322	314	317
16	309	306	308	309	306	308	320	318	319	317	314	316
17	310	305	308	309	308	308	319	318	318	317	316	316
18	310	306	308	309	308	308	320	317	319	322	316	318
19	309	305	308	309	307	308	320	318	319	323	319	322
20	310	303	307	310	309	309	320	312	318	323	318	321
21	308	305	307	311	310	311	320	312	316	323	317	320
22	307	304	306	311	310	311	321	315	319	322	316	318
23	307	302	305	311	309	310	320	314	319	322	317	319
24	307	302	305	311	309	310	320	314	318	323	320	322
25	308	305	306	310	308	309	321	319	320	323	318	322
26	309	306	308	308	307	307	322	316	321	322	317	319
27	309	306	308	308	306	307	322	314	317	317	316	316
28	309	305	308	310	304	308	321	314	317	318	316	317
29	307	305	307	310	303	307	317	312	314	318	316	317
30	308	305	307	308	304	305	321	314	315	318	316	318
31	308	306	307	---	---	---	321	315	316	322	318	319
MONTH	310	298	306	311	303	308	322	305	315	323	312	319

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	325	319	322	331	325	328	285	279	283	312	308	310
2	325	318	323	331	325	328	288	285	287	314	309	311
3	326	320	325	330	325	328	287	282	283	314	308	310
4	326	319	322	331	329	330	289	285	288	311	308	310
5	322	318	319	331	329	330	288	287	287	312	307	310
6	326	318	320	332	329	331	287	285	287	313	309	311
7	327	319	322	334	329	331	298	287	292	314	310	312
8	327	320	323	335	329	332	305	296	304	313	311	312
9	327	323	326	334	329	332	306	303	305	313	309	312
10	328	323	327	335	329	332	308	302	305	312	306	310
11	328	326	327	336	331	334	303	295	299	312	305	309
12	328	327	327	336	331	334	296	292	295	311	306	309
13	329	327	328	332	329	330	295	289	292	312	308	310
14	329	323	327	332	327	330	293	285	289	314	306	311
15	330	323	325	331	320	325	295	283	288	315	308	311
16	330	323	326	321	315	318	289	285	287	313	307	310
17	329	322	325	317	312	315	289	279	285	313	307	310
18	330	328	329	314	303	307	292	287	288	313	306	309
19	329	325	328	309	304	306	293	287	289	313	305	309
20	329	323	326	312	309	312	292	279	283	312	307	309
21	330	323	326	314	310	312	283	276	279	310	306	307
22	331	327	329	314	310	312	285	279	283	311	306	309
23	331	326	328	315	309	314	288	279	283	312	306	309
24	331	327	329	315	308	312	296	289	295	312	307	310
25	332	330	331	316	311	314	301	296	299	312	308	310
26	334	331	332	316	312	315	304	299	301	313	307	310
27	334	326	331	318	312	316	309	303	304	312	306	309
28	331	325	328	312	297	303	311	307	309	311	307	309
29	---	---	---	297	274	276	311	308	310	313	307	311
30	---	---	---	276	274	274	312	306	310	313	307	310
31	---	---	---	278	273	274	---	---	---	312	304	309
MONTH	334	318	326	336	273	317	312	276	293	315	303	310

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	312	304	310	310	307	308	298	291	295	285	272	278
2	313	305	310	310	301	307	300	290	296	288	276	283
3	313	306	309	309	304	307	297	290	293	289	274	281
4	311	303	307	311	299	305	298	286	292	293	279	289
5	311	304	307	309	297	304	296	297	291	294	282	289
6	311	302	306	308	300	306	297	286	290	298	291	294
7	308	298	305	309	298	305	296	286	289	298	293	296
8	307	300	305	309	296	303	293	283	288	303	289	296
9	307	295	301	307	300	304	293	285	288	297	291	296
10	306	296	300	308	296	303	289	273	283	302	297	298
11	307	295	298	305	296	300	290	270	285	301	296	298
12	306	297	301	307	293	299	279	273	276	302	297	299
13	305	296	300	306	298	302	289	276	276	301	297	299
14	306	297	300	306	296	302	282	276	278	302	298	300
15	305	298	301	303	295	300	292	276	279	304	298	301
16	307	299	303	305	296	300	289	276	279	303	300	302
17	307	300	304	303	296	299	283	276	278	304	299	302
18	310	300	306	303	293	299	293	276	279	304	299	302
19	309	302	306	302	289	296	283	276	279	303	299	301
20	311	304	308	302	293	297	283	278	282	303	300	302
21	311	306	308	303	295	300	285	276	282	303	300	302
22	310	305	308	303	291	299	286	279	283	302	298	301
23	309	306	308	300	290	296	286	279	283	303	297	301
24	309	301	306	301	291	296	288	279	283	301	296	299
25	311	301	306	301	292	297	296	279	284	301	295	298
26	309	301	306	300	288	296	296	281	284	302	295	298
27	310	302	306	299	292	295	296	279	284	298	292	296
28	309	298	305	299	293	296	294	274	285	298	287	295
29	311	304	308	298	288	294	288	282	286	298	291	294
30	311	305	309	300	296	296	286	278	284	296	282	291
31	---	---	---	298	298	295	289	262	281	---	---	---
MONTH	313	296	305	311	288	300	300	262	284	304	272	296

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	8.0	6.0	6.5	.0	.0	.0	.0	.0	.0
2	---	---	---	7.5	6.0	6.5	.0	.0	.0	.0	.0	.0
3	---	---	---	7.0	6.0	6.5	.0	.0	.0	.5	.0	.0
4	---	---	---	6.5	5.5	6.0	.0	.0	.0	.5	.0	.0
5	---	---	---	5.5	5.0	5.0	.0	.0	.0	.0	.0	.0
6	---	---	---	5.0	4.5	5.0	.0	.0	.0	.0	.0	.0
7	14.5	---	12.0	4.5	3.5	4.0	.0	.0	.0	.0	.0	.0
8	13.5	12.5	13.0	3.5	3.0	3.0	.0	.0	.0	.0	.0	.0
9	13.0	12.0	12.5	3.0	3.0	3.0	.0	.0	.0	.0	.0	.0
10	13.0	11.5	12.5	3.0	2.5	2.5	.0	.0	.0	.0	.0	.0
11	13.0	11.5	12.0	3.5	2.0	2.5	.0	.0	.0	.0	.0	.0
12	13.5	11.5	12.5	3.0	2.5	3.0	.0	.0	.0	.0	.0	.0
13	13.5	12.0	12.5	3.5	2.5	3.0	.0	.0	.0	.0	.0	.0
14	12.5	11.0	11.5	3.5	2.0	2.5	.0	.0	.0	.0	.0	.0
15	11.5	11.0	11.0	3.5	1.5	2.5	.5	.0	.0	.0	.0	.0
16	10.5	10.0	10.5	4.0	2.0	2.5	.5	.0	.0	.0	.0	.0
17	10.5	9.0	10.0	3.0	2.5	2.5	.0	.0	.0	.0	.0	.0
18	9.0	8.5	9.0	3.0	2.0	2.5	.5	.0	.0	.0	.0	.0
19	9.5	8.5	9.0	3.0	2.0	2.5	.0	.0	.0	.0	.0	.0
20	9.0	8.0	8.5	3.0	2.0	2.5	.0	.0	.0	.0	.0	.0
21	9.0	8.0	8.5	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0
22	8.5	7.5	8.0	2.0	1.0	1.5	.0	.0	.0	.0	.0	.0
23	8.5	7.0	7.5	1.5	1.0	1.5	.0	.0	.0	.0	.0	.0
24	8.0	7.0	7.5	1.0	.5	1.0	.0	.0	.0	.5	.0	.0
25	8.0	7.0	7.5	1.0	.5	1.0	.0	.0	.0	.5	.0	.0
26	7.5	6.5	7.0	1.0	.5	1.0	.0	.0	.0	.0	.0	.0
27	7.5	6.0	6.5	1.0	.5	1.0	.0	.0	.0	.0	.0	.0
28	7.0	5.5	6.0	1.0	.0	.5	.0	.0	.0	.0	.0	.0
29	7.0	6.0	6.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
30	7.0	6.0	6.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
31	7.5	6.0	6.5	---	---	---	.0	.0	.0	.5	.0	.0
MONTH	14.5	5.5	9.5	8.0	.0	3.0	.5	.0	.0	.5	.0	.0

STREAMS TRIBUTARY TO LAKE HURON

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.5	.0	.0	3.5	2.5	3.0	12.5	10.0	11.0
2	.0	.0	.0	.5	.0	.5	3.5	3.0	3.0	12.0	10.0	11.0
3	.0	.0	.0	.5	.0	.5	4.0	2.5	3.0	13.0	10.5	11.5
4	.5	.0	.0	.5	.0	.5	3.5	2.0	3.0	12.5	11.0	11.5
5	.0	.0	.0	.5	.0	.5	2.5	1.5	2.0	12.0	11.0	11.5
6	.0	.0	.0	.5	.0	.5	2.5	1.0	2.0	11.5	10.0	10.0
7	.5	.0	.0	1.0	.0	.5	2.5	1.0	2.0	12.0	10.0	10.5
8	.0	.0	.0	1.0	.0	.5	3.0	1.0	2.0	10.5	10.0	10.0
9	.5	.0	.0	1.0	.5	.5	3.5	1.5	3.0	11.0	8.5	9.5
10	.5	.0	.5	1.5	.5	1.0	5.0	3.0	4.0	11.5	8.5	9.5
11	.5	.0	.5	1.5	.5	1.0	7.5	4.5	6.0	12.5	10.0	10.5
12	.5	.0	.5	1.0	.5	.5	7.0	5.5	6.5	13.5	10.5	11.5
13	.5	.0	.5	1.0	.5	1.0	7.5	6.5	7.0	14.0	12.0	12.5
14	.5	.0	.0	1.5	.5	1.0	7.5	6.0	6.5	15.0	13.5	13.5
15	.5	.0	.0	1.5	.5	1.0	7.0	6.0	6.5	16.0	13.5	13.5
16	.5	.0	.0	1.0	.5	1.0	7.0	6.0	6.5	17.5	13.5	---
17	.5	.0	.0	1.0	.5	.5	7.0	6.0	6.5	18.0	14.0	---
18	.5	.0	.0	1.5	.5	1.0	7.5	7.0	7.5	18.0	15.0	---
19	.5	.0	.0	2.0	.5	1.0	8.0	7.0	7.5	18.5	15.0	---
20	.5	.0	.0	1.5	1.0	1.0	8.5	7.5	8.0	20.0	17.0	---
21	.5	.0	.0	2.0	1.0	1.5	8.5	8.0	8.5	21.5	18.0	19.5
22	.5	.0	.5	2.0	1.0	1.5	10.5	8.5	10.0	20.5	18.5	19.5
23	.5	.0	.0	1.5	1.0	1.5	12.0	9.0	10.0	22.5	20.5	21.0
24	.5	.0	.5	1.5	.5	1.0	10.5	8.5	10.0	21.5	20.0	20.5
25	.5	.0	.0	1.5	1.0	1.0	10.0	9.0	9.5	21.5	19.5	20.5
26	.5	.0	.5	3.0	1.0	2.0	11.0	9.0	10.0	22.0	20.5	21.0
27	.5	.0	.0	2.5	2.0	2.5	12.0	8.5	10.0	22.5	20.0	21.5
28	.5	.0	.0	2.5	2.0	2.5	10.5	8.5	10.0	23.0	21.0	21.5
29	---	---	---	4.5	2.5	3.0	11.5	9.0	10.0	22.0	21.0	21.5
30	---	---	---	3.0	2.5	3.0	12.0	9.0	10.5	22.0	20.5	21.5
31	---	---	---	4.0	3.0	3.5	---	---	---	21.5	20.5	21.0
MONTH	.5	.0	.0	4.5	.0	1.0	12.0	1.0	6.5	23.0	8.5	15.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	20.5	19.5	20.0	19.5	18.0	18.5	22.5	21.0	21.5	23.5	21.5	---
2	20.0	18.0	19.0	20.0	18.0	19.0	21.5	20.5	21.0	22.0	21.0	---
3	19.5	17.5	18.5	19.0	18.0	18.5	22.0	20.5	---	22.5	20.0	---
4	19.5	17.5	18.5	20.5	19.0	19.5	22.5	21.0	---	21.5	20.0	---
5	18.5	17.5	---	21.5	19.5	20.5	23.0	21.0	---	20.5	19.5	---
6	19.0	17.5	---	23.5	22.5	---	22.5	21.5	---	19.5	19.0	---
7	18.5	17.0	---	23.5	21.5	---	23.0	21.5	---	19.0	18.5	---
8	18.0	16.5	---	23.0	21.5	22.0	24.0	22.0	---	20.0	18.0	---
9	17.5	15.5	---	22.5	20.5	21.5	23.0	21.5	---	19.5	18.0	---
10	17.5	14.5	---	22.5	20.5	---	23.0	22.0	---	18.0	17.5	---
11	18.0	16.0	---	23.5	21.5	---	22.5	21.5	---	18.5	16.0	16.5
12	17.5	15.5	---	24.0	22.0	---	22.5	20.5	---	17.0	16.5	16.5
13	17.5	15.5	---	23.0	22.0	---	21.5	20.5	---	17.0	16.5	16.5
14	18.0	16.5	---	23.5	22.0	---	21.5	20.0	---	18.0	15.5	16.0
15	18.5	16.5	---	24.0	23.0	---	21.0	19.5	---	17.5	16.0	16.5
16	20.0	17.5	---	25.0	23.0	---	20.0	19.5	---	17.0	16.5	16.5
17	22.0	19.0	20.0	25.5	23.5	25.0	21.0	19.0	---	17.5	16.5	17.0
18	20.5	18.5	19.5	25.5	24.0	24.5	20.0	18.5	---	18.0	17.0	17.0
19	20.0	19.0	19.5	26.5	24.0	25.5	19.5	18.0	---	17.0	16.5	17.0
20	20.5	18.0	19.0	27.0	25.0	26.0	19.0	18.0	---	16.5	15.5	16.0
21	20.0	18.5	19.5	26.5	24.5	25.5	19.0	18.0	---	16.0	15.5	15.5
22	20.5	19.0	19.5	26.5	24.0	25.5	19.5	18.0	---	16.0	15.5	16.0
23	20.0	19.5	20.0	26.0	24.0	25.0	18.5	17.5	---	17.0	15.0	15.5
24	21.0	19.5	20.5	25.0	23.5	24.0	19.0	17.5	---	15.0	15.0	15.0
25	21.0	19.5	20.0	24.0	22.5	---	19.0	17.5	---	16.5	15.0	15.0
26	22.0	20.5	21.5	23.0	21.5	---	19.5	18.0	---	16.0	15.0	15.5
27	23.0	21.0	22.0	22.5	21.0	---	20.5	19.0	---	15.5	15.0	15.0
28	23.5	21.5	22.5	21.5	21.0	---	22.5	20.5	---	16.5	14.5	15.0
29	21.5	19.5	20.5	21.5	21.0	---	22.0	20.5	---	15.0	15.0	15.0
30	20.0	19.0	20.0	21.5	21.0	21.0	23.0	20.5	---	15.5	14.5	15.0
31	---	---	---	23.0	20.5	21.5	23.0	21.0	---	---	---	---
MONTH	23.5	14.5	20.0	27.0	18.0	22.5	24.0	17.5	21.5	23.5	14.5	16.0

04133500 THUNDER BAY RIVER NEAR BOLTON, MI

LOCATION (REVISED).--Lat 45°07'28", long 83°38'50", in NW¼ SE¼ sec.36, T.32 N., R.6 E., Alpena County, Hydrologic Unit 04070006, on left bank 0.7 mi (1.1 km) upstream from Orchard Hill Bridge, 3.8 mi (6.1 km) upstream from North Branch, 4.7 mi (7.6 km) southwest of Bolton, and 11.0 mi (17.7 km) northwest of Alpena.

DRAINAGE AREA.--588 mi² (1,520 km²).

PERIOD OF RECORD.--March 1945 to current year.

REVISED RECORDS.--WSP 1437: 1946. WSP 1727: 1947(M).

GAGE.--Water-stage recorder. Datum of gage is 671.96 ft (204.813 m) above mean sea level, unadjusted. Prior to Aug. 12, 1945, non-recording gage at site 500 ft (152 m) downstream at different datum.

REMARKS.--Records good except those for the winter period, which are poor. Regulation by Fletcher Pond on the Upper South Branch Thunder Bay River (usable capacity, 40,170 acre-ft or 49.5 hm³). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 468 ft³/s (13.25 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,290 ft³/s (121 m³/s) Mar. 26, 1976, gage height, 10.29 ft (3.136 m); maximum gage height, 10.49 ft (3.197 m) Mar. 25, 1976, backwater from ice; minimum, 92 ft³/s (2.61 m³/s) Sept. 28, 29, 1955.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,250 ft³/s (63.7 m³/s) Mar. 16, gage height, 7.63 ft (2.326 m); minimum, 130 ft³/s (3.68 m³/s) June 26, gage height, 2.54 ft (0.774 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	285	390	400	330	320	330	661	292	206	207	238	307
2	256	414	395	330	320	335	633	287	216	209	320	297
3	262	408	390	330	320	340	612	287	216	211	357	292
4	254	405	385	325	315	340	606	277	211	207	363	282
5	256	411	380	320	315	340	594	270	207	211	372	280
6	260	414	375	320	315	340	567	285	215	215	246	295
7	268	411	370	315	320	350	549	292	232	256	325	300
8	330	408	365	310	320	370	483	275	230	310	323	307
9	302	396	365	305	325	375	492	258	216	330	332	312
10	272	390	360	300	330	380	507	254	209	290	337	307
11	265	381	365	305	330	450	537	248	209	256	357	272
12	260	378	370	310	330	700	561	246	202	236	320	272
13	278	378	375	310	330	1000	576	246	202	224	315	267
14	240	378	380	310	330	1300	543	240	206	216	335	272
15	322	381	380	310	320	1600	501	236	200	207	260	285
16	288	378	375	310	320	2110	468	232	200	202	260	280
17	290	375	370	315	320	1840	423	232	195	198	323	280
18	298	375	365	315	320	1540	426	238	189	207	399	282
19	300	375	360	315	320	1110	429	240	206	207	369	285
20	302	375	355	320	320	679	492	238	200	206	347	307
21	310	381	350	320	315	585	501	277	209	226	342	366
22	312	375	350	320	310	546	510	305	222	238	347	372
23	322	372	340	320	315	495	504	305	213	254	384	357
24	332	384	335	320	315	456	468	285	204	228	340	352
25	330	393	330	320	320	417	423	252	202	222	323	402
26	320	390	330	320	320	396	378	236	198	220	302	537
27	350	400	320	320	325	399	357	224	218	211	295	564
28	355	410	320	320	330	429	335	215	209	206	295	525
29	350	410	325	320	---	561	323	204	209	211	307	483
30	358	410	325	320	---	651	310	204	198	211	325	432
31	358	---	330	320	---	720	---	202	---	222	330	---
TOTAL	9285	11746	11135	9825	8990	21484	14769	7882	6249	7054	10088	10171
MEAN	300	392	359	317	321	693	492	254	208	228	325	339
MAX	358	414	400	330	330	2110	661	305	232	330	399	564
MIN	240	372	320	300	310	330	310	202	189	198	238	267

CAL YR 1976 TOTAL 203342 MEAN 556 MAX 4190 MIN 188
WTR YR 1977 TOTAL 128678 MEAN 353 MAX 2110 MIN 189

04134000 NORTH BRANCH THUNDER BAY RIVER NEAR BOLTON, MI

LOCATION (REVISED).--Lat 45°08'30", long 83°36'21", in SE¼ NW¼ sec.29, T.32 N., R.7 E., Alpena County, Hydrologic Unit 04070006, on left bank 1.5 mi (2.4 km) upstream from mouth, 2.5 mi (4.0 km) south of Bolton, and 10.3 mi (16.6 km) northwest of Alpena.

DRAINAGE AREA.--184 mi² (477 km²).

PERIOD OF RECORD.--March 1945 to current year.

GAGE.--Water-stage recorder. Datum of gage is 675.52 ft (205.898 m) above mean sea level, unadjusted. Prior to Aug. 16, 1945, non-recording gage at site 0.5 mi (0.8 km) upstream at different datum.

REMARKS.--Records good except those for the winter period, which are poor. Occasional regulation during low flows from dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 117 ft³/s (3.313 m³/s), 8.64 in/yr (219 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,950 ft³/s (83.5 m³/s) Mar. 28, 1976, gage height, 7.46 ft (2.274 m); maximum gage height, 7.98 ft (2.432 m) Mar. 31, 1950, backwater from ice; minimum discharge, 0.40 ft³/s (0.011 m³/s) Oct. 14, 1955.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,150 ft³/s (32.6 m³/s) Mar. 17, gage height, 5.64 ft (1.719 m), only peak above base of 500 ft³/s (14.2 m³/s); minimum, 1.7 ft³/s (0.048 m³/s) July 27, 28, 29, 30; minimum gage height, 2.41 ft (0.735 m) July 28, 29, 30.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.7	22	22	12	12	20	485	78	16	8.6	4.6	24
2	5.8	25	21	12	12	20	435	76	17	8.2	4.8	22
3	5.1	26	20	12	12	21	378	73	16	8.0	5.7	21
4	4.8	25	19	12	12	22	321	70	17	8.0	6.5	20
5	3.6	25	18	12	12	23	294	65	17	8.2	8.1	19
6	5.3	24	17	12	12	25	268	65	23	8.0	8.4	18
7	5.7	25	16	12	12	28	248	64	19	11	8.2	17
8	5.4	25	16	12	12	32	229	58	18	12	8.0	18
9	4.8	24	16	12	12	37	214	53	19	14	7.4	17
10	5.3	22	15	12	14	45	213	49	18	16	8.4	17
11	14	21	14	12	16	60	223	47	14	14	8.5	17
12	10	21	14	12	17	80	244	42	13	12	7.9	19
13	11	20	14	12	17	130	267	39	11	10	8.8	18
14	12	20	14	12	17	230	272	38	10	8.5	9.4	19
15	12	19	15	12	16	450	254	36	9.9	7.7	8.7	18
16	16	21	16	12	16	880	228	34	9.3	7.0	9.7	19
17	14	18	16	12	15	993	198	33	8.7	6.8	12	23
18	12	18	16	12	15	942	175	32	8.2	6.8	13	22
19	12	19	16	12	15	728	159	32	8.2	6.1	17	22
20	13	19	16	12	15	613	173	34	11	5.5	19	25
21	14	19	15	12	15	492	167	52	13	5.0	20	30
22	16	18	14	12	16	393	171	56	14	4.5	25	42
23	18	18	14	12	16	327	176	47	14	4.1	25	50
24	20	16	14	12	17	278	177	40	14	3.4	24	50
25	20	17	14	12	21	243	167	35	13	3.2	25	56
26	19	18	13	12	21	207	145	31	12	2.6	21	71
27	18	23	13	12	21	190	125	27	10	2.0	20	101
28	17	24	12	12	20	188	108	23	9.8	1.7	22	123
29	16	24	12	12	---	235	96	20	8.8	1.7	28	129
30	15	23	12	12	---	297	86	18	8.2	2.0	27	121
31	17	---	12	12	---	420	---	16	---	3.8	26	---
TOTAL	371.5	639	476	372	428	8649	6696	1383	400.1	220.4	447.1	1168
MEAN	[illegible]	21.3	15.4	12.0	15.3	279	223	44.6	13.3	7.11	14.4	38.9
MAX	20	26	22	12	21	993	485	78	23	16	28	129
MIN	3.6	16	12	12	12	20	86	16	8.2	1.7	4.6	17
CFSM	.07	.12	.08	.07	.08	1.52	1.21	.24	.07	.04	.08	.21
IN.	.08	.13	.10	.08	.09	1.75	1.35	.28	.08	.04	.09	.24

CAL YR 1976 TOTAL 45900.0 MEAN 125 MAX 2730 MIN 3.6 CFSM .68 IN 9.28
WTR YR 1977 TOTAL 21250.1 MEAN 58.2 MAX 993 MIN 1.7 CFSM .32 IN 4.30

04135500 AU SABLE RIVER AT GRAYLING, MI

LOCATION.--Lat 44°39'35", long 84°42'45", in SE¼ SE¼ sec.7, T.26 N., R.3 W., Crawford County, Hydrologic Unit 04070007, on right bank 65 ft (20 m) upstream from bridge on Interstate Highway 75 (Business Loop) in Grayling, 0.7 mi (1.1 km) upstream from East Branch, and 114 mi (183 km) upstream from mouth.

DRAINAGE AREA.--110 mi² (285 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1942 to current year. Monthly discharge only for some periods, published in WSP 1307. Prior to October 1954, published as Middle Branch Au Sable River at Grayling.

GAGE.--Water-stage recorder above steel-crested dam. Datum of gage is 1,123.49 ft (342.440 m) above mean sea level.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Prior to Dec. 31, 1952, diurnal fluctuation caused by powerplant 2.5 mi (4.0 km) above station.

AVERAGE DISCHARGE.--35 years, 75.1 ft³/s (2.127 m³/s), 9.27 in/yr (235 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 274 ft³/s (7.76 m³/s) June 2, 1943, gage height, 3.00 ft (0.914 m); minimum, 28 ft³/s (0.79 m³/s) Apr. 21, 1946, gage height, 0.80 ft (0.244 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 166 ft³/s (4.70 m³/s) Mar. 31, gage height, 2.18 ft (0.664 m); minimum, 50 ft³/s (1.42 m³/s) July 17, 18, gage height, 1.12 ft (0.341 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	58	75	60	60	61	71	151	77	63	54	63	60
2	57	75	62	62	63	70	138	78	63	54	63	58
3	57	72	62	63	63	71	131	79	63	53	63	58
4	57	71	61	64	63	75	124	79	62	53	63	61
5	58	71	61	64	60	76	122	80	60	53	61	78
6	61	69	62	64	61	77	117	80	67	55	59	85
7	63	68	62	63	61	77	112	78	71	58	62	82
8	62	67	61	62	62	78	109	76	69	59	68	76
9	61	66	60	60	63	84	106	74	65	59	66	71
10	60	66	61	57	64	93	106	73	62	58	65	66
11	60	66	62	61	65	97	109	71	61	55	64	63
12	60	66	62	60	67	108	110	70	62	54	62	62
13	59	65	61	60	69	131	107	69	62	53	59	61
14	59	65	60	60	69	141	104	68	62	52	58	61
15	60	65	64	62	65	141	100	68	61	53	56	60
16	61	65	64	63	63	146	99	69	59	52	61	60
17	62	66	64	62	62	141	96	70	59	51	70	60
18	62	65	65	62	66	127	93	71	58	51	70	60
19	62	64	66	63	64	115	95	70	57	53	66	64
20	62	64	66	65	64	109	96	69	57	52	62	72
21	62	64	59	65	64	105	95	68	57	59	60	74
22	63	64	59	64	60	101	97	66	56	62	60	71
23	65	64	64	62	66	98	95	66	55	58	61	69
24	66	65	64	63	71	92	92	65	55	56	59	69
25	67	64	66	63	74	91	91	63	55	65	58	76
26	66	65	68	62	79	90	88	63	54	63	56	88
27	65	68	65	61	81	92	84	62	54	55	55	89
28	64	68	61	58	77	110	80	61	53	53	56	85
29	63	57	60	60	---	143	78	62	52	52	60	81
30	63	56	60	62	---	160	78	64	53	52	62	75
31	69	---	60	62	---	162	---	62	---	61	62	---
TOTAL	1914	1986	1932	1919	1847	3272	3103	2171	1787	1718	1910	2095
MEAN	61.7	66.2	62.3	61.9	66.0	106	103	70.0	59.6	55.4	61.6	69.8
MAX	69	75	68	65	81	162	151	80	71	65	70	89
MIN	57	56	59	57	60	70	78	61	52	51	55	58
CFSM	.56	.60	.57	.56	.60	.96	.94	.64	.54	.50	.56	.64
IN.	.65	.67	.65	.65	.62	1.11	1.05	.73	.60	.58	.65	.71

CAL YR 1976 TOTAL 29581 MEAN 80.8 MAX 226 MIN 54 CFSM .74 IN 10.00
WTR YR 1977 TOTAL 25654 MEAN 70.3 MAX 162 MIN 51 CFSM .64 IN 8.68

04135500 AU SABLE RIVER AT GRAYLING, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: March 1953 to current year.

INSTRUMENTATION.--Temperature recorder since March 1953.

REMARKS.--Interruptions in the record were due to malfunctions of the recorder.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 28.0°C July 1, 2, 1963; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 26.0°C July 20, 21; minimum recorded, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	13.0	---	4.0	4.0	0.0	0.0	---	---	0.0	0.0	0.0	0.0
2	17.5	---	4.0	4.0	0.0	0.0	---	---	0.0	0.0	0.0	0.0
3	17.5	---	4.0	3.5	0.0	0.0	---	---	---	---	0.0	0.0
4	15.5	---	3.5	3.0	0.0	0.0	---	---	---	---	0.0	0.0
5	13.0	12.0	3.0	3.0	0.0	0.0	---	---	---	---	0.0	0.0
6	12.0	10.0	3.0	2.0	0.0	0.0	---	---	---	---	0.0	0.0
7	10.0	8.5	2.0	2.0	0.0	0.0	---	---	---	---	0.0	0.0
8	9.0	8.0	2.0	1.0	0.0	0.0	---	---	---	---	0.0	0.0
9	9.0	8.0	1.0	1.0	0.0	0.0	---	---	---	---	1.0	0.0
10	8.0	7.5	1.0	1.0	0.0	0.0	---	---	---	---	1.5	0.5
11	---	---	1.0	1.0	0.0	0.0	---	---	---	---	2.0	0.5
12	---	---	1.0	1.0	0.0	0.0	---	---	---	---	3.0	2.0
13	---	---	1.0	1.0	0.0	0.0	0.0	0.0	---	---	3.5	3.0
14	---	---	1.0	0.5	0.0	0.0	0.0	0.0	---	---	4.0	3.5
15	---	---	0.5	0.5	0.0	0.0	0.0	0.0	---	---	4.5	4.0
16	---	---	0.5	0.5	0.0	0.0	0.0	0.0	---	---	4.5	4.5
17	---	---	0.5	0.5	0.0	0.0	0.0	0.0	---	---	4.5	4.5
18	---	---	0.5	0.5	0.0	0.0	0.0	0.0	---	---	4.5	4.5
19	---	---	0.5	0.5	0.0	0.0	0.0	0.0	---	---	4.5	2.0
20	---	---	0.5	0.5	0.0	0.0	0.0	0.0	---	---	4.0	3.0
21	---	---	0.5	0.5	0.0	0.0	0.0	0.0	---	---	4.0	2.5
22	---	---	0.5	0.5	0.0	0.0	0.0	0.0	---	---	4.5	2.5
23	---	---	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	2.5
24	---	---	0.0	0.0	---	---	0.0	0.0	0.0	0.0	2.5	2.0
25	---	---	0.0	0.0	---	---	0.0	0.0	0.0	0.0	---	---
26	---	---	0.0	0.0	---	---	0.0	0.0	0.0	0.0	---	---
27	---	---	0.0	0.0	---	---	0.0	0.0	0.0	0.0	---	---
28	---	---	0.0	0.0	---	---	0.0	0.0	0.0	0.0	---	---
29	3.5	2.0	0.0	0.0	---	---	0.0	0.0	---	---	---	---
30	4.0	3.5	0.0	0.0	---	---	0.0	0.0	---	---	---	---
31	4.0	4.0	---	---	---	---	0.0	0.0	---	---	---	---
MONTH	17.5	2.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	0.0

04135500 AU SABLE RIVER AT GRAYLING, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	---	---	14.5	13.0	17.0	15.5	17.0	16.0	20.5	19.0	19.0	18.5
2	---	---	14.5	14.0	16.0	13.5	18.5	14.0	20.5	19.0	18.5	17.0
3	---	---	15.0	13.5	18.0	14.5	18.5	17.0	19.0	16.5	17.0	15.0
4	---	---	16.0	13.5	18.0	16.5	22.0	18.0	19.5	18.0	17.0	15.0
5	---	---	16.0	15.0	19.0	17.0	24.5	21.5	20.0	19.0	16.0	15.0
6	---	---	16.5	15.5	19.0	16.5	25.5	23.5	21.0	19.5	15.0	13.5
7	---	---	16.0	14.0	16.5	14.5	25.5	23.0	20.5	19.5	14.0	13.5
8	3.5	1.5	16.0	13.5	17.5	15.0	23.0	21.5	19.5	18.5	15.5	13.5
9	6.0	2.5	14.0	12.0	18.0	15.0	22.5	21.0	19.5	18.0	16.0	14.5
10	10.5	6.0	15.0	12.0	19.0	15.5	22.0	19.5	18.5	17.5	16.0	13.5
11	12.0	9.5	17.0	13.0	19.0	17.0	21.5	19.5	18.5	17.5	13.5	11.5
12	13.0	11.5	17.0	14.5	17.0	15.5	22.5	20.5	18.5	15.5	13.5	12.5
13	13.0	12.0	19.0	15.5	17.0	14.5	22.0	20.5	18.5	16.0	13.0	12.5
14	12.0	10.0	20.0	16.5	19.5	15.5	21.0	19.0	17.0	15.5	14.0	11.5
15	11.5	10.0	20.0	17.0	22.0	17.5	23.0	20.5	17.0	15.0	14.0	12.0
16	11.0	10.0	20.0	17.5	21.5	20.0	23.5	21.0	17.0	16.0	14.0	12.5
17	12.5	11.0	20.0	19.0	22.5	20.0	25.0	22.0	16.0	15.0	14.5	13.5
18	13.5	12.5	21.5	19.5	22.5	20.5	25.0	23.0	16.0	13.5	14.5	14.5
19	13.5	13.0	23.0	19.5	21.0	18.5	25.0	22.0	16.0	13.5	14.5	14.5
20	13.5	13.5	23.5	21.0	19.0	18.5	26.0	24.0	16.5	12.5	14.5	12.0
21	13.5	13.5	23.5	21.0	20.0	17.0	26.0	23.5	16.5	14.0	12.0	12.0
22	13.5	13.0	23.5	21.0	20.5	17.5	24.5	20.5	16.5	13.5	12.0	12.0
23	14.0	13.0	22.0	20.5	21.0	19.0	24.0	21.0	16.5	14.5	12.0	11.5
24	14.0	12.0	23.0	20.0	21.5	20.0	23.0	20.5	15.0	13.0	---	---
25	12.0	11.0	23.0	20.5	22.5	21.0	20.5	19.5	15.5	12.5	---	---
26	13.5	10.5	23.0	20.0	22.5	20.0	19.5	17.5	15.5	14.5	---	---
27	14.0	11.5	22.5	20.0	23.0	21.0	20.0	17.0	19.5	15.5	---	---
28	14.0	11.5	22.5	20.0	23.0	21.5	20.0	18.0	20.0	19.5	13.5	12.5
29	14.0	11.5	22.0	18.5	22.0	19.0	19.0	18.0	20.0	19.0	13.5	12.5
30	14.5	12.5	19.5	17.0	19.0	17.5	20.0	18.5	19.0	16.5	12.5	12.0
31	---	---	19.5	17.0	---	---	21.0	19.0	19.0	17.0	---	---
MONTH	14.5	1.5	23.5	12.0	23.0	13.5	26.0	14.0	21.0	12.5	19.0	11.5

04135600 EAST BRANCH AU SABLE RIVER AT GRAYLING, MI

LOCATION.--Lat 44°40'08", long 84°42'20", in NW¼ NW¼ sec.8, T.26 N., R.3 W., Crawford County, Hydrologic Unit 04070007, on right bank, at south boundary of Michigan Department of Natural Resources field office in Grayling (revised) and 0.4 mi (0.6 km) upstream from mouth.

DRAINAGE AREA.--76.0 mi² (196.8 km²).

PERIOD OF RECORD.--April 1958 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,110 ft (338 m) from topographic map. Prior to Sept. 30, 1958, nonrecording gage at site 10 ft (3 m) downstream at present datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Nov. 30 to Jan. 13, which are fair. Occasional regulation by Michigan Department of Natural Resources field office above gage. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 45.0 ft³/s (1.274 m³/s), 8.04 in/yr (204 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 207 ft³/s (5.86 m³/s) Mar. 28, 1976, gage height, 5.24 ft (1.597 m); minimum, 7.0 ft³/s (0.20 m³/s) Mar. 27, 1965, result of freezeup; minimum daily, 16 ft³/s (0.45 m³/s) Aug. 20, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 104 ft³/s (2.95 m³/s) Mar. 31, gage height, 4.20 ft (1.280 m); minimum, 19 ft³/s (0.54 m³/s) Nov. 29, result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	33	41	30	26	29	39	92	50	41	32	34	31
2	32	38	30	27	29	38	86	50	40	31	34	30
3	31	38	30	28	28	38	82	50	39	31	36	30
4	31	38	29	28	28	39	78	50	39	31	35	38
5	32	38	29	28	29	41	78	50	38	32	33	49
6	36	38	30	28	28	41	73	50	45	33	32	45
7	36	38	29	27	28	42	68	49	43	33	32	43
8	35	37	29	27	30	43	66	48	41	36	32	42
9	34	37	29	26	31	47	65	47	39	35	33	38
10	34	36	29	26	32	53	67	48	38	33	35	37
11	34	36	30	27	33	63	67	47	38	31	33	36
12	33	35	29	26	34	67	67	47	38	31	31	35
13	33	35	29	26	34	82	65	46	38	30	31	35
14	34	35	30	26	34	82	63	46	37	30	30	35
15	36	34	30	27	35	84	62	45	36	30	29	33
16	36	34	31	28	35	90	62	46	35	29	37	33
17	34	35	31	28	34	87	60	47	35	28	39	33
18	34	35	31	27	34	80	61	46	35	29	36	34
19	34	36	31	27	33	75	61	45	34	30	34	37
20	35	36	30	26	33	72	62	44	34	28	34	44
21	35	36	28	27	33	71	62	44	36	35	33	40
22	37	35	29	26	33	69	66	43	34	33	33	38
23	38	36	31	26	33	66	64	43	33	30	32	37
24	38	35	31	26	39	62	60	42	33	30	32	38
25	38	35	31	27	38	60	58	41	32	32	31	44
26	38	36	31	28	39	60	56	40	32	29	30	47
27	36	37	29	27	40	62	54	40	31	28	30	47
28	35	35	27	27	40	76	51	39	31	27	30	45
29	35	31	26	27	---	94	50	39	31	27	33	41
30	36	29	26	28	---	101	50	38	31	27	32	40
31	41	---	26	28	---	101	---	39	---	35	31	---
TOTAL	1084	1075	911	836	926	2025	1956	1399	1087	956	1017	1155
MEAN	35.0	35.8	29.4	27.0	33.1	65.3	65.2	45.1	36.2	30.8	32.8	38.5
MAX	41	41	31	28	40	101	92	50	45	36	39	49
MIN	31	29	26	26	28	38	50	38	31	27	29	30
CFSM	.46	.47	.39	.36	.44	.86	.86	.59	.48	.41	.43	.51
IN.	.53	.53	.45	.41	.45	.99	.96	.68	.53	.47	.50	.57

CAL YR 1976 TOTAL 17871 MEAN 48.8 MAX 195 MIN 26 CFSM .64 IN 8.75
WTR YR 1977 TOTAL 14427 MEAN 39.5 MAX 101 MIN 26 CFSM .52 IN 7.06

04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI

LOCATION.--Lat 44°36'53", long 84°27'20", in SE¼ SE¼ sec.29, T.26 N., R.1 W., Crawford County, Hydrologic Unit 04070007, on right bank 10 ft (3 m) upstream from Smith Bridge, 400 ft (122 m) downstream from bridge on State Highway 72, 4.6 mi (7.4 km) upstream from mouth, and 9.1 mi (14.6 km) west of Luzerne.

DRAINAGE AREA.--401 mi² (1,039 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1951-66. October 1966 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,070 ft (326 m) from topographic map. Apr. 19, 1951, to Nov. 14, 1966, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period and those periods of no gage-height record, Dec. 5 to Feb. 22, which are poor. Occasional regulation by dams above station.

AVERAGE DISCHARGE.--11 years, 227 ft³/s (6.429 m³/s), 7.69 in/yr (195 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,120 ft³/s (31.7 m³/s) Mar. 28, 1976, gage height, 7.30 ft (2.225 m); minimum, 99 ft³/s (2.80 m³/s) July 24, 27, 1977, gage height, 4.11 ft (1.253 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 452 ft³/s (12.8 m³/s) Mar. 16, gage height, 5.50 ft (1.676 m); minimum, 99 ft³/s (2.80 m³/s) July 24, 27, gage height, 4.11 ft (1.253 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	119	146	150	135	130	150	307	199	139	111	115	131
2	119	143	150	135	130	150	306	207	142	111	113	132
3	119	138	150	135	135	156	324	207	139	110	114	132
4	119	136	150	135	135	159	323	203	134	108	111	162
5	119	157	155	135	130	170	363	200	133	108	121	150
6	126	169	155	135	130	167	362	199	144	108	125	150
7	138	174	155	130	135	167	341	192	144	113	127	144
8	137	176	155	130	135	167	320	187	139	118	123	132
9	130	177	155	130	135	179	302	181	132	119	118	126
10	128	177	155	130	132	198	291	174	129	113	122	119
11	127	176	155	125	144	229	282	175	127	110	120	117
12	125	179	150	125	150	267	273	173	129	110	116	114
13	128	177	150	130	154	358	268	168	128	110	115	110
14	125	176	145	130	150	396	263	162	126	107	118	109
15	125	170	150	130	140	417	255	155	124	106	120	109
16	125	157	150	135	140	452	253	154	123	104	134	113
17	125	162	150	130	140	410	250	155	122	102	144	112
18	125	174	155	130	144	370	252	155	121	104	139	117
19	125	174	155	135	144	324	251	150	118	108	126	136
20	126	169	155	140	144	280	249	146	118	105	122	176
21	128	168	140	140	140	254	248	146	118	106	129	180
22	134	164	140	135	140	234	253	149	116	104	144	166
23	138	158	145	130	140	220	248	155	114	102	136	164
24	138	155	145	130	156	205	245	157	112	101	126	174
25	139	159	140	135	163	193	240	149	112	104	120	202
26	138	166	145	135	159	191	231	143	112	104	119	181
27	132	169	140	130	161	191	223	139	110	101	121	188
28	129	165	135	125	155	215	215	135	110	100	118	174
29	128	140	135	130	---	277	206	132	110	101	124	159
30	130	142	135	135	---	293	202	133	109	104	131	172
31	143	---	135	135	---	311	---	134	---	114	135	---
TOTAL	3987	4893	4580	4100	3991	7750	8146	5114	3733	3326	3846	4351
MEAN	129	163	148	132	143	250	272	165	124	107	124	145
MAX	143	179	155	140	163	452	363	207	144	119	144	202
MIN	119	136	135	125	130	150	202	132	109	100	111	109
CFSM	.32	.41	.37	.33	.36	.62	.68	.41	.31	.27	.31	.36
IN.	.37	.45	.42	.38	.37	.72	.76	.47	.35	.31	.36	.40

CAL YR 1976 TOTAL 88119 MEAN 241 MAX 1110 MIN 111 CFSM .60 IN 8.17
WTR YR 1977 TOTAL 57817 MEAN 158 MAX 452 MIN 100 CFSM .39 IN 5.36

04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1966 to current year.

INSTRUMENTATION.--Temperature recorder since November 1966.

REMARKS.--Interruptions in the record were due to malfunctions of the recorder.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.0°C July 16, 1968, July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 24.0°C July 20; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	---	---	6.0	5.0	0.0	0.0	0.5	0.0	0.0	0.0	1.5	1.0
2	---	---	6.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.5
3	---	---	6.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.0
4	---	---	5.0	5.0	0.5	0.0	0.0	0.0	0.0	0.0	2.0	2.0
5	---	---	5.0	5.0	0.5	0.5	0.5	0.0	0.0	0.0	2.5	2.0
6	9.5	9.0	5.0	4.0	0.5	0.5	0.5	0.5	0.0	0.0	2.5	2.5
7	9.5	8.5	4.5	4.0	0.5	0.5	0.5	0.5	0.0	0.0	4.0	2.5
8	9.0	7.5	4.0	3.0	0.5	0.5	0.5	0.5	0.5	0.0	4.0	3.0
9	8.5	7.5	3.5	3.0	0.5	0.5	0.5	0.5	1.0	0.5	5.0	3.5
10	8.5	8.0	3.5	3.5	1.0	0.5	0.5	0.5	2.0	1.0	5.0	3.0
11	10.5	8.5	3.0	2.5	1.0	0.5	0.5	0.0	2.0	1.5	5.0	3.5
12	10.5	9.5	3.0	2.5	1.0	0.5	0.0	0.0	2.0	1.0	4.5	3.5
13	10.5	9.5	3.0	3.0	1.0	0.5	0.0	0.0	1.5	1.0	3.5	2.5
14	9.5	8.0	3.0	2.5	1.0	0.5	0.0	0.0	1.0	0.5	2.5	2.0
15	9.0	8.5	3.0	2.0	1.0	1.0	0.0	0.0	0.5	0.0	3.0	2.0
16	8.5	8.0	2.5	2.0	1.5	1.0	0.0	0.0	0.0	0.0	3.5	3.5
17	7.5	6.5	2.0	2.0	1.5	1.5	0.5	0.0	0.0	0.0	3.5	2.5
18	7.0	6.5	2.5	2.0	1.5	1.5	0.0	0.0	0.5	0.0	3.0	3.0
19	6.5	6.5	2.5	2.0	1.5	1.5	0.0	0.0	1.0	0.0	4.0	2.5
20	7.0	6.5	2.5	2.5	2.0	1.0	0.0	0.0	1.0	0.5	4.0	3.5
21	7.0	6.0	2.5	2.0	1.0	0.5	0.5	0.0	0.5	0.0	4.5	3.5
22	6.5	6.0	2.0	2.0	0.5	0.5	0.5	0.0	2.0	0.5	5.5	3.5
23	6.5	5.5	2.0	2.0	0.5	0.5	0.0	0.0	2.0	0.5	5.0	3.5
24	6.5	6.0	2.0	1.5	0.5	0.5	1.0	0.0	2.0	0.5	4.5	2.5
25	7.0	6.5	1.5	1.0	1.0	0.5	1.0	1.0	2.0	1.5	4.0	3.0
26	7.0	6.0	2.0	1.5	1.0	1.0	1.0	0.5	2.0	1.0	6.5	4.0
27	6.0	5.5	2.0	1.5	1.0	0.5	0.5	0.5	2.0	1.0	6.5	5.5
28	5.5	5.0	1.5	0.5	0.5	0.5	0.5	0.5	2.0	1.0	7.0	6.5
29	6.0	5.0	0.5	0.5	1.0	0.5	0.5	0.5	---	---	9.0	6.5
30	6.5	6.0	0.5	0.0	1.0	0.5	1.0	0.5	---	---	8.5	8.0
31	6.5	6.0	---	---	0.5	0.5	1.0	0.0	---	---	8.5	7.0
MONTH	10.5	5.0	6.0	0.0	2.0	0.0	1.0	0.0	2.0	0.0	9.0	0.5

04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	7.0	5.0	14.5	11.5	13.0	12.5	14.5	13.5	19.0	15.5	19.0	17.5
2	5.5	5.0	16.0	12.5	15.5	11.0	17.5	12.0	18.5	15.5	18.0	16.0
3	6.5	4.5	15.0	11.5	16.0	10.5	17.0	13.5	17.5	14.0	18.0	14.0
4	6.0	5.0	15.5	12.0	15.5	12.5	20.5	14.5	18.5	14.5	17.5	14.0
5	5.0	4.0	16.5	13.5	16.5	13.0	22.0	17.5	19.0	16.0	17.0	15.5
6	4.0	3.0	16.5	13.0	16.5	13.0	22.0	18.5	19.5	16.0	15.5	14.0
7	3.5	3.5	16.0	12.0	14.5	11.0	20.5	18.0	19.0	17.0	15.5	14.5
8	5.0	3.0	14.0	10.5	15.5	11.5	20.0	16.5	19.0	16.0	17.0	14.5
9	6.5	4.0	13.5	9.5	17.0	11.0	19.5	16.5	18.0	15.0	18.0	15.5
10	9.5	5.5	14.0	9.5	17.5	12.0	19.5	15.0	18.0	15.0	16.5	13.5
11	12.5	8.5	15.5	10.0	16.5	14.0	20.0	15.5	17.0	15.0	14.0	11.0
12	13.5	11.0	15.0	11.5	14.0	13.0	20.0	17.0	17.5	12.5	14.0	12.5
13	13.5	12.0	17.0	12.5	14.5	11.5	21.0	17.0	16.5	13.5	14.0	13.0
14	13.0	9.5	17.5	12.5	18.0	12.0	19.5	16.0	16.0	13.0	14.5	11.0
15	12.0	9.5	17.5	12.5	18.5	13.5	21.5	17.0	15.5	12.5	14.0	11.5
16	11.5	9.5	17.5	14.0	18.5	15.0	21.0	17.0	15.5	14.0	14.0	12.5
17	13.0	10.0	17.5	15.0	20.5	16.0	23.0	18.5	16.5	13.5	14.5	13.5
18	14.0	12.0	19.0	15.0	20.5	15.5	21.0	18.0	15.5	12.0	14.0	13.5
19	14.5	12.5	19.5	15.5	19.0	15.5	23.5	17.5	14.0	11.5	13.5	13.5
20	15.0	13.5	20.0	16.0	18.0	14.5	24.0	20.0	14.0	10.0	13.5	12.5
21	14.5	13.5	20.5	16.5	17.5	13.0	23.0	19.5	14.0	12.5	12.5	12.5
22	14.0	13.0	20.0	16.0	18.5	13.0	21.0	16.0	15.5	11.5	12.5	12.0
23	14.5	11.5	19.5	15.5	18.0	14.0	20.0	16.5	14.5	12.5	12.0	12.0
24	13.5	11.0	20.5	16.0	19.5	16.0	19.0	16.5	15.0	11.5	12.0	12.0
25	13.0	10.0	20.5	16.0	20.0	16.0	19.5	16.0	15.0	10.5	14.5	12.0
26	13.0	9.5	19.5	14.5	20.0	14.5	18.5	14.0	15.0	13.0	14.5	13.5
27	15.5	10.5	19.5	14.0	20.0	16.0	18.0	13.0	20.0	14.5	13.5	13.0
28	14.0	11.5	19.5	14.5	19.5	16.5	17.0	15.0	21.5	19.0	13.5	12.0
29	14.0	10.0	18.0	14.5	18.5	15.0	16.0	15.0	20.5	18.0	13.0	11.5
30	14.5	11.0	18.0	12.5	15.5	14.5	18.0	14.5	19.0	15.0	12.5	11.5
31	---	---	17.0	13.0	---	---	19.0	16.0	19.5	16.5	---	---
MONTH	15.5	3.0	20.5	9.5	20.5	10.5	24.0	12.0	21.5	10.0	19.0	11.0

04136500 AU SABLE RIVER AT MIO, MI

LOCATION.--Lat 44°39'36", long 84°07'52", in NW¼ sec.7, T.26 N., R.3 E., Oscoda County, Hydrologic Unit 04070007, on right bank 150 ft (46 m) upstream from bridge on State Highway 33 in Mio, 500 ft (152 m) downstream from Mio hydroelectric plant, 9.5 mi (15.3 km) downstream from Big Creek, and 73.0 mi (117.5 km) upstream from mouth.

DRAINAGE AREA.--1,100 mi² (2,850 km²), approximately.

PERIOD OF RECORD.--July 1952 to current year.

GAGE.--Water-stage recorder. Datum of gage is 929.60 ft (283.342 m) above mean sea level.

REMARKS.--Records good except those for periods of no gage-height record, Mar. 30 to May 6 and Aug. 27 to Sept. 27, which are poor. Flow regulated at all stages by hydroelectric plant 500 ft (152 m) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 990 ft³/s (28.04 m³/s), 12.22 in/yr (310 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,170 ft³/s (118 m³/s) Mar. 28, 1976, gage height, 6.14 ft (1.871 m); minimum, 7.0 ft³/s (0.20 m³/s) Aug. 4, 1977, gage height, -0.09 ft (-0.027 m); minimum daily, 21 ft³/s (0.59 m³/s) Aug. 9, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,590 ft³/s (73.3 m³/s) Aug. 1, gage height, 4.81 ft (1.466 m); minimum, 7.0 ft³/s (0.20 m³/s) Aug. 4, gage height, -0.09 ft (-0.027 m) when gates in dam at Mio were closed; minimum daily, 21 ft³/s (0.59 m³/s) Aug. 9, when gates in dam at Mio were closed.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	787	929	605	771	728	857	1380	870	857	700	2060	800
2	793	902	719	892	757	853	1320	1030	868	725	2040	800
3	793	899	740	903	833	858	1370	1000	802	746	1160	770
4	931	879	806	867	1050	863	1240	980	795	738	880	830
5	591	869	893	861	879	942	1380	980	810	772	866	1030
6	933	892	885	839	760	909	1330	970	835	768	833	1100
7	629	911	858	821	784	859	1340	958	956	790	818	1060
8	842	910	810	821	804	904	1310	918	776	818	486	950
9	838	816	799	753	804	915	1280	900	825	866	21	770
10	866	904	838	689	816	1050	1290	875	796	844	266	790
11	911	824	857	716	838	1100	1290	864	780	720	534	820
12	822	835	865	791	871	1210	1320	884	781	687	561	770
13	836	856	824	801	877	1730	1300	884	808	774	534	740
14	498	879	816	791	859	1840	1180	861	810	649	538	740
15	1010	890	883	830	749	1660	1140	855	785	771	556	760
16	886	890	870	793	684	1750	1140	868	776	725	595	760
17	834	873	861	750	753	1720	1150	898	776	708	825	800
18	815	861	880	833	848	1460	1200	908	776	708	975	760
19	837	873	855	878	862	1320	1210	881	745	743	960	770
20	852	873	848	854	837	1260	1220	852	729	769	875	920
21	831	858	814	830	800	1210	1200	882	764	750	751	980
22	884	849	712	789	826	1160	1290	884	753	783	703	940
23	867	883	829	799	841	1090	1190	873	738	780	776	900
24	873	855	807	829	875	1100	1120	865	748	749	825	920
25	920	855	821	847	967	1050	1100	854	753	746	826	1100
26	880	880	885	834	908	989	1080	820	729	749	739	1210
27	817	884	817	756	872	1000	1020	768	725	745	730	1130
28	842	897	662	678	873	1120	980	752	719	723	780	1060
29	837	834	645	717	---	1420	940	783	706	728	820	1020
30	841	675	641	735	---	1540	880	793	694	756	800	989
31	927	---	728	724	---	1530	---	794	---	788	780	---
TOTAL	25823	26035	24873	24792	23355	37269	36190	27304	23415	23318	24913	26989
MEAN	833	868	802	800	834	1202	1206	881	781	752	804	900
MAX	1010	929	893	903	1050	1840	1380	1030	956	866	2060	1210
MIN	498	675	605	678	684	853	880	752	694	649	21	740
CFSM	.76	.79	.73	.73	.76	1.09	1.10	.80	.71	.68	.73	.82
IN.	.87	.88	.84	.84	.79	1.26	1.22	.92	.79	.79	.84	.91

CAL YR 1976 TOTAL 396999 MEAN 1085 MAX 4110 MIN 461 CFSM .99 IN 13.43
WTR YR 1977 TOTAL 324276 MEAN 888 MAX 2060 MIN 21 CFSM .81 IN 10.97

04138500 AU GRES RIVER NEAR NATIONAL CITY, MI

LOCATION.--Lat 44°10'26", long 83°44'36", in NE¼ NE¼ sec.31, T.21 N., R.6 E., Iosco County, Hydrologic Unit 04080101, on left bank 15 ft (5 m) upstream from highway bridge on Allen Road, 1.7 mi (2.7 km) upstream from Elm Creek, 4.4 mi (7.1 km) southwest of National City, 12.8 mi (20.6 km) southwest of Tawas City, and 13 mi (21 km) upstream from mouth.

DRAINAGE AREA.--169 mi² (438 km²).

PERIOD OF RECORD.--October 1950 to current year. Monthly discharge only October, November, 1950, published in WSP 1727.

REVISED RECORDS.--WSP 1911: 1959-60.

GAGE.--Water-stage recorder. Altitude of gage is 710 ft (216 m) by barometer. Prior to Oct. 1, 1951, nonrecording gage at site 1.5 mi (2.4 km) upstream at different datum. Oct. 1, 1951 to July 24, 1969, water-stage recorder at site 50 ft (15 m) downstream at present datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Nov. 30 to Mar. 29, which are poor. Some regulation at low flows. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--27 years, 96.4 ft³/s (2.730 m³/s), 7.75 in/yr (197 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,720 ft³/s (77.0 m³/s) Mar. 21, 1976; maximum gage height, 10.64 ft (3.243 m) Mar. 6, 1974, backwater from ice; minimum discharge, 5.9 ft³/s (0.17 m³/s) Nov. 3, 1966, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 345 ft³/s (9.77 m³/s) Mar. 11, based on correlation with nearby stations; minimum discharge, 10 ft³/s (0.28 m³/s) July 24; minimum gage height, 0.62 ft (0.189 m) July 23, 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	30	21	22	25	51	122	27	21	15	25	124
2	30	31	21	22	25	50	108	33	21	15	21	92
3	25	30	21	22	25	53	124	32	21	14	22	64
4	21	28	21	22	25	70	107	28	19	14	27	38
5	22	29	21	22	26	96	149	35	17	23	37	70
6	39	29	22	22	26	135	134	43	22	23	53	54
7	40	30	22	23	26	120	100	32	25	18	22	37
8	28	29	22	23	27	140	86	28	21	19	27	30
9	27	28	22	23	27	190	78	26	18	19	38	26
10	24	27	22	23	27	250	71	26	17	15	20	22
11	23	25	22	23	27	300	68	25	15	14	19	20
12	22	24	22	23	27	260	66	24	17	13	17	19
13	21	24	22	23	27	230	63	24	17	44	14	18
14	21	24	22	23	27	215	58	23	16	20	15	18
15	21	23	22	23	28	190	54	22	17	15	16	17
16	21	22	22	23	28	170	47	24	15	14	22	20
17	22	23	22	23	28	150	43	30	15	14	54	30
18	26	23	22	23	29	130	44	29	15	14	27	53
19	25	23	22	23	29	115	48	26	14	13	19	66
20	26	23	22	23	29	105	44	23	14	12	19	69
21	25	23	22	23	29	96	44	20	14	12	20	47
22	26	23	22	24	30	90	52	32	14	11	63	36
23	28	21	22	24	30	85	50	67	13	11	36	32
24	28	20	22	24	30	82	45	37	13	13	33	37
25	28	20	22	24	62	80	40	49	13	16	25	151
26	27	21	22	24	57	90	37	29	13	18	20	88
27	27	21	22	24	54	130	33	23	13	18	19	82
28	27	21	22	24	52	230	31	20	13	18	20	58
29	27	21	22	24	---	210	32	18	14	21	98	43
30	26	21	22	24	---	166	30	18	15	25	56	38
31	28	---	22	25	---	135	---	18	---	26	27	---
TOTAL	805	737	677	718	882	4414	2008	891	492	537	931	1499
MEAN	26.0	24.6	21.8	23.2	31.5	142	66.9	28.7	16.4	17.3	30.0	50.0
MAX	40	31	22	25	62	300	149	67	25	44	98	151
MIN	21	20	21	22	25	50	30	18	13	11	14	17
CFSM	.15	.15	.13	.14	.19	.84	.40	.17	.10	.10	.18	.30
IN.	.18	.16	.15	.16	.19	.97	.44	.20	.11	.12	.20	.33

CAL YR 1976 TOTAL 39010 MEAN 107 MAX 2420 MIN 15 CFSM .63 IN 8.59
WTR YR 1977 TOTAL 14591 MEAN 40.0 MAX 300 MIN 11 CFSM .24 IN 3.21

04140500 RIFLE RIVER AT SELKIRK, MI

LOCATION.--Lat 44°18'48", long 84°04'10", in SE¼ NE¼ sec.9, T.22 N., R.3 E., Ogemaw County, Hydrologic Unit 04060101, on left bank at upstream side of bridge on State Road at Selkirk, 1.0 mi (1.6 km) downstream from Klacking Creek.

DRAINAGE AREA.--117 mi² (303 km²).

PERIOD OF RECORD.--September 1950 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 828.47 ft (252.518 m) above mean sea level.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation from dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--27 years, 143 ft³/s (4.050 m³/s), 16.60 in/yr (422 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,760 ft³/s (78.2 m³/s) May 20, 1959, gage height, 6.70 ft (2.060 m); minimum, 52 ft³/s (1.47 m³/s) July 23, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 525 ft³/s (14.9 m³/s) Mar. 14, gage height, 2.95 ft (0.895 m), only peak above base of 500 ft³/s (14.2 m³/s); maximum gage height, 3.52 ft (1.073 m) Feb. 25, backwater from ice; minimum discharge, 52 ft³/s (1.47 m³/s) July 23, gage height, 1.47 ft (0.448 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	83	113	76	84	96	110	213	105	85	67	72	140
2	82	104	92	84	96	110	199	120	84	64	72	144
3	86	100	105	86	94	110	255	117	79	63	78	133
4	83	99	105	86	94	110	229	109	77	69	89	114
5	84	100	96	86	96	110	237	114	77	123	134	132
6	109	99	92	86	96	115	212	119	92	97	136	141
7	116	97	90	86	96	125	181	107	95	87	104	139
8	102	93	86	82	96	145	163	103	84	91	128	115
9	96	93	82	82	96	165	148	106	80	84	105	103
10	93	94	79	85	96	250	144	101	76	76	96	93
11	93	93	76	88	96	293	147	100	76	72	91	87
12	91	93	72	88	96	342	147	96	78	82	82	76
13	90	94	71	90	98	457	144	95	78	103	87	78
14	91	94	72	92	96	466	140	93	75	88	111	92
15	90	93	72	94	96	323	130	91	73	80	93	79
16	91	94	72	92	98	284	131	101	79	71	105	93
17	94	92	72	94	98	233	128	115	79	72	103	89
18	92	94	72	94	97	206	135	105	78	69	119	105
19	95	95	74	94	97	191	142	98	78	74	103	103
20	101	94	74	95	97	188	137	93	67	65	105	101
21	96	94	72	95	97	179	138	91	78	61	107	108
22	103	92	86	94	97	173	150	91	66	58	159	134
23	110	95	86	95	98	166	148	101	65	56	132	101
24	112	93	82	96	120	156	127	92	65	58	113	109
25	108	94	80	96	130	155	120	87	72	63	97	106
26	102	97	80	96	120	152	116	82	65	58	98	102
27	98	102	80	93	115	155	113	79	61	56	98	109
28	96	90	80	96	110	179	108	77	61	56	86	174
29	95	62	80	96	---	273	105	76	69	58	131	140
30	97	67	80	96	---	279	104	76	64	63	126	131
31	114	---	81	96	---	236	---	74	---	71	119	---
TOTAL	2993	2814	2517	2817	2812	6436	4574	3014	2214	2249	3263	4038
MEAN	96.5	93.8	81.2	90.9	100	208	152	97.2	73.8	72.5	105	135
MAX	116	113	105	96	130	466	255	120	95	123	163	243
MIN	82	62	71	82	94	110	104	74	61	56	68	79
CFSM	.83	.80	.69	.78	.86	1.78	1.30	.83	.63	.62	.90	1.15
IN.	.95	.89	.80	.90	.89	2.05	1.45	.96	.70	.72	1.04	1.28

CAL YR 1976 TOTAL 52698 MEAN 144 MAX 1020 MIN 58 CFSM 1.23 IN 16.76
WTR YR 1977 TOTAL 39741 MEAN 109 MAX 466 MIN 56 CFSM .93 IN 12.64

STREAMS TRIBUTARY TO LAKE HURON

04161000 SOUTH BRANCH SHEPARDS CREEK NEAR SELKIRK, MI

LOCATION.--Lat 44°18'28", long 84°01'15", in SE¼ SE¼ sec.8, T.22 N., R.3 E., Ogemaw County, Hydrologic Unit 04080101, on right bank 200 ft (61 m) upstream from mouth, 600 ft (183 m) west of bridge on Bedtelyon Road, and 1.1 mi (1.8 km) southwest of Selkirk.

DRAINAGE AREA.--1.15 mi² (2.98 km²).

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 1557: 1952(M), 1954(M), 1955(P). WSP 2111: Drainage area.

GAGE.--Water-stage recorder and V notch sharp-crested weir. Altitude of gage is 845 ft (258 m) by barometer.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Nov. 30 to Jan. 11, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--26 years, 0.54 ft³/s (0.0153 m³/s), 6.38 in/yr (162 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 181 ft³/s (5.13 m³/s) Apr. 3, 1956, from rating curve extended above 40 ft³/s (1.13 m³/s); maximum gage height, 4.42 ft (1.347 m) Apr. 3, 1956, May 28, 1973, no flow at times each year, except 1956, and 1967-77.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 27 ft³/s (0.76 m³/s) Mar. 9, gage height, 2.90 ft (0.884 m), only peak above base of 20 ft³/s (0.57 m³/s); minimum discharge, 0.01 ft³/s (<0.001 m³/s) on several days in June and July; minimum gage height, 1.08 ft (0.329 m) June 27, 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.04	.14	.07	.08	.08	.50	.37	.11	.06	.04	.03	.33
2	.04	.13	.07	.08	.08	.50	.56	.15	.06	.03	.06	.43
3	.04	.12	.06	.08	.08	.52	.60	.13	.05	.03	.08	.26
4	.04	.11	.08	.08	.08	.56	.47	.12	.05	.08	.08	.28
5	.05	.09	.08	.08	.08	3.5	.98	.15	.04	.16	.36	.59
6	.20	.08	.08	.08	.08	2.3	.48	.14	.07	.06	.28	.26
7	.15	.08	.08	.08	.08	3.9	.29	.12	.06	.07	.13	.20
8	.11	.07	.08	.08	.08	3.9	.23	.11	.05	.07	.78	.16
9	.10	.07	.08	.08	.09	18	.20	.10	.04	.06	.22	.13
10	.09	.08	.08	.08	.10	4.7	.22	.10	.04	.04	.17	.11
11	.08	.07	.08	.08	.10	2.9	.23	.09	.04	.03	.12	.10
12	.08	.08	.08	.08	.09	4.2	.24	.09	.04	.19	.09	.09
13	.08	.08	.08	.08	.08	4.4	.24	.08	.04	.12	.09	.09
14	.09	.08	.08	.08	.08	1.8	.22	.08	.03	.07	.10	.09
15	.09	.07	.08	.08	.08	1.3	.19	.07	.03	.05	.07	.08
16	.08	.07	.08	.08	.08	.98	.20	.12	.03	.04	.37	.10
17	.08	.07	.08	.08	.08	.56	.19	.11	.03	.05	.24	.10
18	.08	.07	.08	.08	.08	.42	.24	.09	.03	.04	.14	.31
19	.10	.07	.08	.08	.08	.48	.23	.07	.03	.03	.11	.50
20	.11	.07	.08	.08	.08	.42	.23	.06	.03	.02	.10	.32
21	.10	.07	.08	.08	.08	.33	.23	.06	.03	.03	.47	.21
22	.11	.07	.08	.08	.09	.28	.20	.07	.03	.02	.61	.17
23	.11	.07	.08	.08	.09	.23	.22	.09	.03	.02	.27	.17
24	.11	.07	.08	.08	1.5	.19	.18	.07	.03	.02	.22	.71
25	.10	.07	.08	.08	1.8	.15	.16	.06	.02	.03	.14	.63
26	.10	.07	.08	.08	1.1	.16	.15	.06	.01	.02	.11	.92
27	.09	.07	.08	.08	.80	.17	.14	.05	.02	.01	.10	.44
28	.09	.07	.08	.08	.60	.49	.13	.04	.02	.01	.09	.25
29	.10	.07	.08	.08	---	1.3	.13	.04	.08	.02	.64	.20
30	.10	.06	.08	.08	---	.57	.12	.04	.04	.02	.25	.18
31	.29	---	.08	.08	---	.56	---	.05	---	.06	.24	---
TOTAL	3.04	2.30	2.44	2.48	7.72	92.19	6.28	2.72	1.16	1.54	6.68	8.41
MEAN	.098	.077	.079	.080	.28	1.48	.21	.088	.039	.050	.22	.28
MAX	.30	.14	.08	.08	1.8	18	.98	.15	.08	.19	.78	.92
MIN	.04	.06	.07	.08	.08	.15	.12	.04	.01	.01	.03	.08
CFSM	.09	.07	.07	.07	.24	1.46	.24	.08	.03	.04	.19	.24
IN.	.10	.08	.08	.08	.25	1.69	.27	.09	.04	.05	.22	.27

CAL YR 1976	TOTAL 235.99	MEAN .64	MAX 28	MIN .02	CFSM .56	IN 7.61
WTR YR 1977	TOTAL 99.07	MEAN .27	MAX 18	MIN .01	CFSM .24	IN 3.20

04142000 RIFLE RIVER NEAR STERLING, MI

LOCATION.--Lat 44°04'21", long 84°01'12", in NE¼ SW¼ sec.5, T.19 N., R.4 E., Arenac County, Hydrologic Unit 04080101, on left bank 30 ft (9 m) downstream from bridge on Old M-70, 2.8 mi (4.5 km) north of Sterling, and 20 mi (32 km) upstream from mouth.

DRAINAGE AREA.--320 mi² (830 km²), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--November 1905 to December 1908 (gage heights and discharge measurements only), October 1936 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as Rifle River at Michigan Highway 70 near Sterling 1936-61.

REVISED RECORDS.--WSP 1437: 1937(M), 1939-40(M).

GAGE.--Water-stage recorder. Datum of gage is 649.48 ft (197.962 m) above mean sea level. November 1905 to December 1908, nonrecording gage at site 400 ft (122 m) downstream at different datum. Jan. 13, 1937, to Jan. 10, 1939, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Occasional regulation from dams above station.

AVERAGE DISCHARGE.--41 years, 307 ft³/s (8.694 m³/s), 13.03 in/yr (331 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,340 ft³/s (151 m³/s) Mar. 28, 1950, gage height, 13.74 ft (4.188 m), from rating curve extended above 3,800 ft³/s (108 m³/s); minimum, 75 ft³/s (2.12 m³/s) Nov. 22, 1964, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,040 ft³/s (29.5 m³/s) Mar. 13, gage height, 5.04 ft (1.536 m), no peak above base of 1,600 ft³/s (45.3 m³/s); maximum gage height, 6.61 ft (2.015 m) Mar. 12, backwater from ice; minimum discharge, 114 ft³/s (3.23 m³/s) June 28, July 24, 28; minimum gage height, 1.22 ft (0.372 m) July 24, 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	136	209	200	155	150	250	401	192	156	129	134	219
2	136	193	185	155	150	235	360	208	160	129	131	257
3	146	181	180	155	150	240	416	214	151	125	135	245
4	157	175	175	155	150	320	409	197	146	129	129	204
5	160	175	175	155	150	430	420	199	146	151	148	237
6	185	177	175	160	150	440	419	210	157	180	212	263
7	190	189	170	160	145	410	347	194	170	154	196	215
8	177	177	170	155	150	400	311	184	154	174	192	188
9	168	175	170	155	155	580	280	183	147	172	203	170
10	181	173	170	155	160	820	273	183	143	148	173	157
11	177	168	170	155	160	900	272	174	142	138	164	148
12	166	166	165	155	170	970	272	172	147	136	147	144
13	157	166	165	155	180	992	269	169	149	221	139	139
14	159	168	160	155	190	938	261	165	143	174	153	142
15	159	160	160	155	210	686	248	162	139	153	165	144
16	155	165	160	155	190	561	245	179	134	140	204	147
17	164	160	160	155	190	451	243	201	133	137	248	150
18	179	160	155	155	195	372	249	193	131	137	197	184
19	173	164	155	155	200	327	264	175	131	133	158	253
20	177	164	155	155	200	322	256	166	130	128	153	284
21	171	164	155	155	200	305	257	160	132	122	150	273
22	171	162	150	155	200	289	278	165	130	121	221	223
23	191	170	155	155	210	274	276	177	125	117	223	201
24	193	165	155	155	270	256	248	172	126	117	191	204
25	193	165	155	155	350	245	235	159	126	124	164	332
26	179	166	155	155	320	237	222	152	126	122	148	401
27	181	191	155	155	285	239	213	148	119	116	142	398
28	181	190	155	155	270	275	202	146	116	115	146	313
29	173	190	155	155	---	472	198	142	130	121	222	250
30	175	195	155	155	---	555	194	150	129	125	238	220
31	195	---	150	155	---	456	---	145	---	129	186	---
TOTAL	5305	5223	5070	4815	5500	14247	8538	5436	4168	4317	5412	6705
MEAN	171	174	164	155	196	460	285	175	139	139	175	224
MAX	195	209	200	160	350	992	420	214	170	221	248	401
MIN	136	160	150	155	145	235	194	142	116	115	129	139
CFSM	.53	.54	.51	.48	.61	1.44	.89	.55	.43	.43	.55	.70
IN.	.62	.61	.59	.56	.64	1.66	.99	.63	.48	.50	.63	.78

CAL YR 1976 TOTAL 119569 MEAN 327 MAX 2160 MIN 128 CFSM 1.02 IN 13.90
WTR YR 1977 TOTAL 74736 MEAN 205 MAX 992 MIN 115 CFSM .64 IN 8.69

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1966-72, 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to current year.
WATER TEMPERATURES: November 1974 to current year.
SUSPENDED-SEDIMENT DISCHARGE: Water year 1970.

INSTRUMENTATION.--Water quality monitor since Aug. 28, 1975.

REMARKS.--Monthly samples are collected as a cross-section sample at or near vicinity of bridge. Interruptions in the daily record are due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 489 micromhos Feb. 17, 1977; minimum, 157 micromhos Aug. 31, 1975.
WATER TEMPEATURES: Maximum, 30.5°C July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 489 micromhos Feb. 17; minimum, 303 micromhos Mar. 12.
WATER TEMPERATURES: Maximum, 30.5°C July 20; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UM-MF (COL./ 100 ML)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)
OCT												
12...	1430	166	410	8.3	11.0	13.2	120	260	815	848	210	13
NOV												
02...	1700	193	431	8.2	5.5	12.7	99	92	30	180	210	21
30...	1430	195	430	8.3	.0	13.3	93	88	820	812	210	13
JAN												
18...	1230	155	470	7.8	.0	15.2	106	120	23	23	220	24
FEB												
15...	1400	210	445	7.8	.0	12.6	88	510	829	E40	220	32
MAR												
10...	1345	870	337	7.8	.5	13.2	92	>800	>600	B460	140	17
APR												
07...	1500	341	431	7.9	3.5	12.7	100	640	810	--	200	44
MAY												
05...	1330	207	433	7.9	15.0	10.8	110	4800	20	24	220	36
JUN												
09...	1330	146	416	8.6	17.0	9.6	100	4400	820	16	210	15
JUL												
14...	1430	197	390	8.5	23.0	9.8	115	8320	110	59	200	18
AUG												
04...	1515	127	405	8.2	22.5	10.0	116	800	846	824	210	38
SEP												
15...	1315	143	432	8.6	15.0	10.0	100	3700	116	51	230	49

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
OCT												
12...	59	15	11	.3	1.3	240	0	197	1.9	30	17	.1
NOV												
02...	58	16	10	.3	1.1	230	0	189	2.3	32	17	.1
30...	59	16	12	.4	1.1	240	0	197	1.9	29	19	.1
JAN												
18...	62	16	11	.3	1.0	240	0	197	6.1	29	15	.1
FEB												
15...	62	16	12	.4	1.2	230	0	189	5.8	30	21	.1
MAR												
10...	41	9.7	8.2	.3	3.1	150	0	123	3.8	30	14	.1
APR												
07...	55	14	9.9	.3	1.3	190	0	156	3.8	--	--	--
MAY												
05...	62	15	11	.3	1.2	220	0	180	4.4	36	16	.1
JUN												
09...	58	16	10	.3	.8	230	4	195	1.0	30	15	.1
JUL												
14...	54	15	10	.3	1.2	210	6	182	1.1	21	14	.1
AUG												
04...	58	16	10	.3	.9	210	0	172	2.1	26	15	.1
SEP												
15...	63	18	11	.3	1.2	220	0	181	.9	32	17	.1

B--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	SUS-PENDED SEDI-MENT (MG/L)	SUS-PENDED SEDI-MENT DIS-CHARGE (T/DAY)	SUS. SED. SIEVE DIAM. % FINER THAN .062 MM
OCT											
12...	7.9	249	260	112	.01	.26	1.2	.05	9	4.0	100
NOV											
02...	7.3	257	255	134	.00	.15	.66	.04	4	2.1	100
30...	6.9	254	261	134	.07	.10	.44	.03	50	26	100
JAN											
18...	11	269	263	113	.22	.49	2.2	.03	2	.84	100
FEB											
15...	10	257	266	146	.31	.74	3.3	.04	10	5.7	100
MAR											
10...	5.6	194	186	456	.58	2.0	8.8	.16	45	106	100
APR											
07...	--	--	--	--	.27	.87	3.9	.04	24	22	100
MAY											
05...	5.2	285	255	159	.01	.39	1.7	.03	23	13	100
JUN											
09...	6.8	274	253	108	.01	.49	2.2	.03	20	7.9	100
JUL											
14...	7.4	237	232	126	.01	.45	2.0	.02	20	11	100
AUG											
04...	6.8	265	236	90.9	.01	.27	1.2	.02	26	8.9	100
SEP											
15...	7.4	265	258	102	.00	.17	.75	.01	7	2.7	100

DATE	TIME	TOTAL ARSENIC (AS) (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	TOTAL CAD-MIUM (CD) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	TOTAL CHRO-MIUM (CR) (UG/L)	DIS-SOLVED CHRO-MIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	TOTAL IRON (FE) (UG/L)
OCT												
12...	1430	2	2	1	1	<10	<10	0	0	0	0	190
JAN												
18...	1230	--	2	1	1	<10	<10	0	0	0	0	200
APR												
07...	1500	2	2	1	1	10	<10	0	0	10	0	530
JUL												
14...	1430	4	3	--	10	10	0	0	0	3	0	460

DATE	DIS-SOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	TOTAL MAN-GANESE (MN) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	TOTAL SELE-NIUM (SE) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	TOTAL ZINC (ZN) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	TOTAL ORGANIC CARBON (C) (MG/L)
OCT												
12...	30	10	9	30	20	<.5	<.5	0	0	10	10	5.0
JAN												
18...	10	16	5	30	10	<.5	<.5	0	0	10	10	4.8
APR												
07...	20	6	6	50	20	<.5	<.5	0	0	20	10	7.1
JUL												
14...	10	24	--	40	10	.0	.0	0	0	30	20	6.1

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	OCT 12,76		NOV 2,76		NOV 30,76		JAN 18,77		FEB 15,77	
TIME	1430		1700		1430		1230		1400	
TOTAL CELLS/ML	980		520		370		280		820	
DIVERSITY: DIVISION	0.1		1.1		0.7		1.1		1.0	
.CLASS	0.4		1.6		0.8		1.1		1.0	
..ORDER	1.3		1.9		1.0		1.1		1.2	
...FAMILY	2.8		2.8		3.1		1.9		1.7	
....GENUS	3.0		2.9		3.4		2.4		2.3	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	--	-	3	1	--	-
....CLOSTERIOPSIS	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	*	0
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	*	0	13	3	--	-	20	2
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	19	2	12	2	--	-	--	-	10	1
...PHACOTACEAE										
....WISLOUCHIELLA	--	-	6	1	--	-	--	-	--	-
...VOLVOCACEAE										
....EUDORINA	--	-	200#	38	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	340#	35	49	10	13	3	--	-	26	3
....MELOSIRA	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	110	12	12	2	6	2	--	-	7	1
....COCCONEIS	76	8	*	0	16	4	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	10	3	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	6	1	10	3	--	-	*	0
....CYMBELLA	110	12	6	1	10	3	6	2	13	2
....EPITHEMIA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	19	2	18	4	83#	22	72#	26	49	6
....OPEPHORA	--	-	--	-	--	-	--	-	7	1
...FRAGILARIACEAE										
....FRAGILARIA	76	8	--	-	6	2	--	-	--	-
....SYNEDRA	--	-	12	2	6	2	21	8	16	2
...GOMPHONEMATACEAE										
....GOMPHONEMA	38	4	--	-	19	5	3	1	*	0
...NAVICULACEAE										
....GYROSIGMA	--	-	*	0	6	2	--	-	--	-
....NAVICULA	94	10	43	8	67#	18	15	5	56	7
....NEIDIUM	--	-	6	1	--	-	--	-	--	-
....STAURONEIS	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....HANTZSCHIA	--	-	--	-	--	-	--	-	--	-
....NITZSCHIA	57	6	62	12	67#	18	6	2	16	2
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....DINOBRYON	38	4	74	14	6	2	--	-	--	-
.XANTHOPHYCEAE										
..HETEROCOCCALES										
...CENTRITRACTACEAE										
....CENTRITRACTUS	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	OCT 12,76 1430		NOV 2,76 1700		NOV 30,76 1430		JAN 18,77 1230		FEB 15,77 1400	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..HORMOGONALES										
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	75#	27	140#	17
....OSCILLATORIA	--	-	--	-	29	8	78#	28	460#	55
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	--	-	12	2	--	-	--	-	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....PHACUS	--	-	--	-	3	1	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE / TIME	MAY 5,77 1330		JUN 9,77 1330		JUL 14,77 1430		AUG 4,77 1515		SEP 15,77 1315	
TOTAL CELLS/ML	3700		6400		2600		470		6300	
DIVERSITY: DIVISION	0.5		0.7		1.2		0.9		1.1	
.CLASS	0.7		0.7		1.4		1.0		1.1	
..ORDER	1.4		1.3		2.0		1.0		1.3	
...FAMILY	1.8		1.9		2.8		2.8		2.8	
....GENUS	1.9		2.0		3.0		3.3		2.9	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	440#	17	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	830	13	--	-	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	28	1	--	-	--	-	--	-	--	-
....MICRACTINIUM	170	4	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	--	-	--	-	--	-
....CLOSTERIOPSIS	--	-	100	2	--	-	--	-	51	1
....DICTYOSPHAERIUM	--	-	--	-	70	3	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	320	12	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	210	3
....CRUCIGENIA	--	-	210	3	--	-	--	-	--	-
....SCENEDESMUS	--	-	210	3	140	5	97#	21	210	3
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	28	1	--	-	70	3	6	1	410	7
...PHACOTACEAE										
....WISLOUCHIELLA	--	-	--	-	--	-	--	-	--	-
...VOLVOCACEAE										
....EUDORINA	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	2600#	70	3900#	61	1000#	39	--	-	--	-
....MELOSIRA	--	-	--	-	18	1	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	55	1	--	-	--	-	--	-	--	-
....COCCONEIS	*	0	100	2	*	0	58	13	920	15
....RHOICOSPHENIA	--	-	--	-	*	0	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	100	2	--	-	39	8	720	11
....CYMBELLA	28	1	52	1	35	1	39	8	--	-
....EPITHEMIA	--	-	--	-	--	-	26	6	--	-
...DIATOMACEAE										
....DIATOMA	55	1	52	1	--	-	71#	15	1400#	22
....OPEPHORA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....FRAGILARIA	--	-	--	-	88	3	--	-	150	2
....SYNEDRA	140	4	--	-	--	-	52	11	51	1
...GOMPHONEMATACEAE										
....GOMPHONEMA	28	1	--	-	18	1	--	-	--	-
...NAVICULACEAE										
....GYROSIGMA	--	-	--	-	--	-	--	-	--	-
....NAVICULA	300	8	670	10	140	5	45	10	1300#	20
....NEIDIUM	--	-	--	-	--	-	--	-	--	-
....STAURONEIS	--	-	--	-	--	-	13	3	--	-
...NITZSCHIACEAE										
....HANTZSCHIA	--	-	100	2	--	-	--	-	--	-
....NITZSCHIA	110	3	--	-	110	4	6	1	--	-
...SURIRELLACEAE										
....SURIRELLA	--	-	52	1	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	55	1	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	18	1	--	-	--	-
.XANTHOPHYCEAE										
..HETEROCOCCALES										
...CENTRITRACTACEAE										
....CENTRITRACTUS	--	-	--	-	18	1	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	MAY 5,77		JUN 9,77		JUL 14,77		AUG 4,77		SEP 15,77	
TIME	1330		1330		1430		1515		1315	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..NOSTOCALES										
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-	--	-	920	15
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	28	1	--	-	35	1	--	-	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	110	3	--	-	35	1	6	1	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	6	1	--	-
....PHACUS	--	-	--	-	18	1	--	-	--	-
....TRACHELOMONAS	--	-	--	-	35	1	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

PERIPHYTON

DATE	LENGTH OF EXPOSURE (DAYS)	BIOMASS CHLOROPHYLL RATIO PERIPHYTON (UNITS)	PERIPHYTON BIOMASS ASH WEIGHT G/SQ M	PERIPHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)	CHLOR-B PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)
OCT 12...	41	3768	52.8	67.7	--	--
JUN 09...	35	5911	13.7	16.1	.406	.129
AUG 04...	21	2973	27.3	31.7	1.48	2.14

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	407	398	402	429	426	428	435	430	431	417	408	413
2	406	400	403	435	431	433	431	430	430	408	394	400
3	405	384	400	435	431	433	431	430	431	395	390	392
4	390	381	385	432	428	430	430	427	429	390	384	387
5	396	390	393	430	427	429	426	412	420	388	383	386
6	390	372	382	428	418	425	412	392	402	391	387	389
7	397	380	388	416	413	415	392	388	390	396	388	392
8	394	385	389	415	413	414	393	389	391	397	394	396
9	399	390	395	417	414	416	397	391	394	402	397	399
10	392	387	389	420	416	418	400	391	397	412	403	409
11	397	389	393	417	412	414	394	390	392	412	406	410
12	413	397	405	412	410	411	394	390	392	408	400	405
13	415	404	408	412	409	411	395	391	393	408	407	407
14	408	398	404	411	408	409	394	387	391	---	---	---
15	409	402	404	409	403	407	388	384	387	---	---	---
16	414	411	413	419	404	411	384	377	381	---	---	---
17	413	390	405	410	400	405	381	373	376	---	---	---
18	400	394	396	404	401	403	375	372	373	404	400	402
19	403	381	394	401	399	400	375	373	375	402	396	399
20	403	389	396	400	398	399	377	375	376	399	394	397
21	409	404	407	399	394	397	384	377	381	397	393	395
22	416	409	413	393	389	391	404	385	392	399	396	398
23	408	401	403	395	387	391	406	394	401	406	400	404
24	406	401	404	392	386	389	394	388	391	411	409	411
25	412	407	409	398	387	393	389	386	387	413	410	412
26	416	413	414	391	383	387	388	384	386	421	414	418
27	417	407	413	391	379	382	387	385	386	424	420	422
28	417	411	413	380	374	378	393	383	388	435	424	430
29	425	421	423	424	380	405	399	389	394	448	438	446
30	430	421	428	430	423	428	403	396	399	452	448	450
31	427	416	423	---	---	---	417	405	413	450	446	448
MONTH	430	372	403	435	374	408	435	372	396	452	383	408

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	449	441	446	453	450	452	422	418	420	430	423	426
2	444	435	440	453	448	451	426	423	424	429	420	424
3	439	435	436	451	449	451	436	426	430	430	418	422
4	458	442	451	447	414	436	433	425	428	422	416	418
5	466	461	464	410	391	398	425	422	423	431	422	427
6	471	468	469	388	386	387	428	422	424	433	428	431
7	474	469	471	390	388	389	427	424	426	432	427	429
8	474	468	472	388	382	386	433	423	428	428	424	426
9	472	462	468	379	351	369	442	422	432	426	423	424
10	472	464	467	347	327	339	440	429	434	426	423	425
11	467	452	460	330	315	324	447	434	440	430	424	427
12	453	447	450	333	303	318	446	439	443	431	428	430
13	452	447	450	318	307	313	441	433	438	435	429	432
14	450	448	449	317	308	312	436	429	432	431	426	429
15	474	452	457	341	315	328	430	424	427	428	426	427
16	484	473	479	351	343	349	429	425	427	428	411	421
17	489	483	486	358	350	355	430	427	429	421	418	419
18	487	484	485	368	361	365	435	424	430	421	415	418
19	483	471	478	379	364	371	430	426	428	442	421	426
20	469	461	465	386	376	382	431	426	428	455	439	446
21	463	458	460	392	385	388	434	427	431	463	440	449
22	461	456	459	400	389	394	432	420	425	---	---	---
23	462	458	460	407	396	401	427	421	424	---	---	---
24	459	424	446	417	404	410	428	420	423	---	---	---
25	421	417	418	426	417	420	428	423	426	---	---	---
26	424	414	418	436	425	429	430	423	426	---	---	---
27	439	422	429	448	436	441	433	424	428	---	---	---
28	451	437	447	448	418	441	427	422	425	---	---	---
29	---	---	---	418	407	413	425	419	422	---	---	---
30	---	---	---	416	404	410	426	419	423	---	---	---
31	---	---	---	420	410	416	---	---	---	---	---	---
MONTH	489	414	456	453	303	388	447	418	428	463	411	427

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	398	388	394	440	433	437	404	387	395
2	---	---	---	406	385	394	434	424	427	403	386	391
3	---	---	---	397	387	392	419	408	413	408	395	403
4	---	---	---	408	391	399	405	379	398	402	393	398
5	---	---	---	415	398	406	399	373	387	395	374	380
6	---	---	---	404	390	399	397	360	378	393	376	386
7	---	---	---	395	385	390	383	367	376	409	392	402
8	---	---	---	395	354	381	389	371	381	408	401	404
9	---	---	---	392	376	385	386	364	374	416	402	409
10	416	399	408	401	383	392	379	367	374	418	410	414
11	413	400	409	401	384	392	382	364	376	417	413	415
12	413	406	410	405	388	396	379	362	371	422	413	416
13	409	400	405	392	370	381	282	366	375	---	---	---
14	406	397	401	396	375	384	376	369	375	---	---	---
15	408	394	400	406	393	400	373	361	369	419	417	418
16	408	397	402	406	395	402	373	327	354	425	417	422
17	408	398	403	403	388	399	364	354	358	427	424	426
18	408	398	403	396	380	390	365	357	361	429	414	422
19	409	394	401	391	372	383	376	365	370	416	407	412
20	421	407	415	413	375	398	390	372	379	409	387	404
21	421	408	415	420	409	415	388	380	385	392	385	387
22	423	406	415	420	411	415	380	366	374	401	394	398
23	416	402	409	424	418	421	379	375	378	405	403	405
24	414	396	407	428	410	419	397	374	383	408	398	405
25	417	403	409	447	427	437	410	385	395	422	398	405
26	417	401	408	455	440	447	424	405	412	424	395	405
27	413	402	407	453	440	447	442	423	430	412	398	404
28	410	402	407	446	445	446	441	413	432	413	400	405
29	404	398	401	448	447	448	412	384	403	419	409	412
30	399	393	396	441	429	433	402	378	390	431	421	426
31	---	---	---	437	424	429	401	380	393	---	---	---
MONTH	423	393	406	455	354	407	442	327	387	431	374	406
YEAR	489	303	409									

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	15.0	10.5	12.5	5.5	3.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0
2	15.5	11.0	13.0	5.5	4.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0
3	15.5	11.5	13.5	4.5	2.5	3.5	0.0	0.0	0.0	0.0	0.0	0.0
4	15.5	11.5	13.5	3.5	1.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0
5	15.0	13.0	14.0	4.5	2.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
6	14.0	10.5	12.0	4.5	2.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0
7	10.5	8.0	9.0	4.0	1.5	3.0	0.0	0.0	0.0	0.0	0.0	0.0
8	8.5	6.0	7.5	1.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
9	8.5	5.5	7.0	1.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
10	9.0	6.5	8.0	1.5	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
11	11.0	8.0	9.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	12.5	8.5	10.5	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	11.5	10.0	10.5	1.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
14	9.5	7.0	8.5	1.0	0.0	0.5	0.0	0.0	0.0	---	---	---
15	8.5	7.5	8.0	0.5	0.0	0.0	0.0	0.0	0.0	---	---	---
16	7.0	5.5	6.5	0.0	0.0	0.0	0.0	0.0	0.0	---	---	---
17	6.5	4.5	5.5	0.5	0.0	0.0	0.0	0.0	0.0	---	---	---
18	6.0	4.5	5.0	1.5	0.0	0.5	0.0	0.0	0.0	---	---	---
19	5.5	4.5	5.0	2.0	0.0	1.0	0.0	0.0	0.0	0.5	0.0	0.0
20	6.0	4.5	5.0	1.5	1.0	1.0	0.0	0.0	0.0	0.5	0.0	0.0
21	6.0	4.5	5.0	1.0	0.0	1.0	0.0	0.0	0.0	0.5	0.0	0.0
22	5.5	3.5	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0
23	5.5	3.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	5.5	4.5	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	6.5	5.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	5.0	4.0	4.5	2.5	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0
27	4.5	2.0	3.0	2.5	1.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0
28	4.0	1.0	2.5	2.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
29	5.5	2.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	6.0	4.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	6.5	5.0	5.5	---	---	---	0.0	0.0	0.0	0.0	0.0	0.0
MONTH	15.5	1.0	7.5	5.5	0.0	1.0	0.0	0.0	0.0	0.5	0.0	0.0

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	0.0	0.0	0.0	0.0	0.0	0.0	6.5	4.5	5.5	16.0	11.0	13.5
2	0.5	0.0	0.5	0.0	0.0	0.0	6.0	5.0	5.5	18.5	13.0	15.5
3	0.5	0.0	0.5	0.0	0.0	0.0	8.5	4.5	6.5	17.5	12.0	14.5
4	0.0	0.0	0.0	0.0	0.0	0.0	6.5	5.5	6.0	15.5	12.0	14.0
5	0.5	0.0	0.0	0.0	0.0	0.0	5.0	3.0	4.5	17.0	13.5	14.5
6	0.5	0.0	0.5	0.0	0.0	0.0	5.0	2.0	3.0	18.5	13.0	15.5
7	0.5	0.0	0.5	0.0	0.0	0.0	3.0	0.5	2.0	17.5	12.0	15.0
8	0.5	0.0	0.5	0.0	0.0	0.0	4.5	0.0	1.5	16.0	10.5	13.0
9	0.5	0.0	0.0	0.0	0.0	0.0	6.0	0.0	2.0	15.0	9.5	12.0
10	0.5	0.0	0.5	0.5	0.0	0.0	10.0	3.5	6.5	16.5	9.5	13.0
11	0.5	0.0	0.5	0.5	0.5	0.5	14.0	7.5	10.5	18.0	10.5	14.0
12	0.5	0.0	0.5	3.5	0.5	1.0	16.0	11.0	13.0	17.0	12.5	15.0
13	0.5	0.0	0.0	4.5	3.0	4.0	14.5	12.0	13.0	19.5	13.5	16.5
14	0.0	0.0	0.0	5.0	2.5	3.5	14.0	9.0	11.5	20.0	13.5	16.5
15	0.0	0.0	0.0	7.0	3.0	5.0	10.5	8.0	9.0	20.0	13.5	16.5
16	0.0	0.0	0.0	6.0	3.5	5.5	12.0	8.0	9.5	20.0	14.5	17.0
17	0.5	0.0	0.0	4.5	2.0	3.0	14.0	9.0	11.5	21.0	16.5	18.5
18	0.5	0.0	0.0	3.0	1.5	2.5	15.5	12.0	13.5	24.0	18.0	21.0
19	0.0	0.0	0.0	5.5	0.5	2.5	16.5	12.0	14.5	25.0	18.5	21.5
20	0.0	0.0	0.0	4.5	2.0	3.0	17.0	14.0	15.0	26.0	19.5	23.0
21	0.0	0.0	0.0	5.0	2.5	3.5	16.5	14.5	15.5	25.5	20.5	23.0
22	0.0	0.0	0.0	6.5	2.5	4.0	15.5	14.0	14.5	---	---	---
23	0.0	0.0	0.0	5.0	1.5	3.0	15.5	12.0	13.5	---	---	---
24	0.0	0.0	0.0	5.0	0.0	2.0	13.0	10.5	12.0	---	---	---
25	0.0	0.0	0.0	3.0	0.5	1.5	13.5	9.5	11.5	---	---	---
26	0.0	0.0	0.0	6.5	0.0	3.0	14.5	8.5	11.5	---	---	---
27	0.0	0.0	0.0	8.0	2.5	5.5	16.0	9.0	12.5	---	---	---
28	0.0	0.0	0.0	8.0	7.0	7.5	14.5	10.5	12.5	---	---	---
29	---	---	---	11.5	7.0	9.0	15.0	8.5	11.5	---	---	---
30	---	---	---	10.5	8.0	9.0	16.0	9.5	12.5	---	---	---
31	---	---	---	8.5	6.5	8.0	---	---	---	---	---	---
MONTH	0.5	0.0	0.0	11.5	0.0	3.0	17.0	0.0	9.5	26.0	9.5	16.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	19.0	17.0	18.0	23.5	19.0	22.0	22.0	19.0	20.0
2	---	---	---	22.5	15.0	18.5	22.0	19.0	20.0	19.5	17.0	18.5
3	---	---	---	21.0	17.0	19.0	23.0	18.0	20.5	20.5	16.5	18.5
4	---	---	---	26.5	18.5	22.0	23.5	19.0	21.5	19.0	18.0	18.5
5	---	---	---	29.0	23.0	25.5	24.0	20.5	22.5	18.5	16.5	17.5
6	---	---	---	29.5	23.5	26.5	23.5	21.5	22.5	18.0	16.5	17.0
7	---	---	---	27.0	24.0	25.5	23.5	21.0	22.0	20.0	16.5	18.0
8	---	---	---	25.0	23.0	24.0	23.5	21.0	22.0	18.0	15.0	17.0
9	---	---	---	25.5	21.5	23.5	22.0	18.5	20.5	18.0	13.5	15.5
10	20.0	13.0	16.5	24.5	19.0	22.0	23.5	19.0	21.0	17.5	14.5	16.0
11	18.5	15.5	16.5	24.5	18.5	21.5	22.0	19.0	20.0	17.0	14.5	16.0
12	17.5	15.5	16.5	24.0	20.0	22.0	22.0	16.0	19.0	18.0	14.0	15.5
13	18.5	13.0	16.0	26.0	19.5	23.0	21.0	17.5	19.5	15.0	15.0	15.0
14	21.5	14.0	17.5	25.0	20.0	22.5	22.0	18.0	20.0	---	---	---
15	23.0	16.0	19.5	29.0	22.5	25.5	21.0	16.0	18.5	16.5	15.5	16.0
16	23.5	17.5	21.0	27.0	23.5	24.5	19.5	18.0	18.5	18.0	15.0	16.5
17	26.0	20.0	23.0	28.5	23.0	25.5	20.0	16.5	18.5	18.5	16.5	17.5
18	25.5	21.5	23.5	26.5	23.5	25.0	19.0	15.0	17.0	18.0	17.0	17.5
19	24.0	19.0	22.0	30.0	23.0	26.5	17.5	14.5	15.5	17.5	16.0	16.5
20	23.0	19.0	21.0	30.5	25.0	28.0	18.0	12.0	15.0	16.5	15.0	15.5
21	22.5	17.0	20.0	29.0	22.0	26.0	17.0	14.5	16.0	14.5	14.0	14.5
22	23.0	16.5	20.0	26.5	19.0	22.5	19.5	14.5	16.5	14.5	13.5	14.0
23	23.0	17.0	20.0	25.5	16.5	21.0	17.5	16.0	16.5	14.5	13.0	14.0
24	25.0	19.0	22.0	21.5	17.5	20.0	18.5	13.5	15.5	14.5	13.5	14.0
25	26.0	21.5	23.5	24.0	20.0	22.0	19.0	13.0	16.0	17.0	13.5	15.0
26	25.5	18.5	22.5	23.0	15.5	19.5	19.0	15.0	17.0	17.0	15.0	15.5
27	26.5	20.0	23.5	23.0	11.0	17.0	23.5	17.5	20.0	16.0	14.0	15.0
28	25.0	22.0	23.5	21.0	15.5	18.5	25.0	21.5	23.5	15.5	13.0	14.0
29	24.0	20.5	22.0	20.0	17.5	19.0	24.0	18.5	21.0	14.0	12.0	13.0
30	20.0	17.5	18.5	22.5	18.0	20.0	22.5	18.0	20.5	14.0	12.5	13.0
31	---	---	---	23.5	19.0	21.5	23.0	18.5	21.0	---	---	---
MONTH	26.5	13.0	20.5	30.5	11.0	22.5	25.0	12.0	19.5	22.0	12.0	16.0

04143500 NORTH BRANCH KAWKAWLIN RIVER NEAR KAWKAWLIN, MI

LOCATION.--Lat 43°40'05", long 83°58'13", in SE¼ SE¼ sec.27, T.15 N., R.4 E., Bay County, Hydrologic Unit 04080102, on left bank 50 ft (15 m) upstream from bridge on Beaver Road, 1.7 mi (2.7 km) northwest of Kawkawlin, and 2.4 mi (3.9 km) upstream from mouth.

DRAINAGE AREA.--101 mi² (262 km²).

PERIOD OF RECORD.--March 1951 to current year.

GAGE.--Water-stage recorder. Datum of gage is 584.00 ft (178.003 m) above mean sea level (levels by Michigan Department of Natural Resources). Prior to Sept. 26, 1951, nonrecording gage at site 70 ft (21 m) downstream, and Sept. 27, 1951, to Sept. 30, 1960, water-stage recorder at present site, at datum 2.00 ft (0.610 m) higher.

REMARKS.--Records good except those for the winter period, and those for period of no gage-height record, Oct. 1 to Nov. 12, which are fair. Some diversion above station for irrigation. Some regulation during low flows from dams above station. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--26 years, 59.1 ft³/s (1.674 m³/s), 7.95 in/yr (202 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,610 ft³/s (45.6 m³/s) May 18, 1974, gage height, 10.92 ft (3.328 m); no flow at times in each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 87 ft³/s (2.46 m³/s) Mar. 13, gage height, 4.58 ft (1.396 m); maximum gage height, 5.31 ft (1.618 m) Mar. 4, ice jam; no flow Oct. 1 to Feb. 23, June 15 to Aug. 9, Aug. 17-28, Sept. 8-17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	.00	.00	.00	3.4	28	16	.13	.00	.00	.21
2	.00	.00	.00	.00	.00	4.0	34	15	.24	.00	.00	.41
3	.00	.00	.00	.00	.00	3.5	55	14	.19	.00	.00	.44
4	.00	.00	.00	.00	.00	35	56	13	.11	.00	.00	.26
5	.00	.00	.00	.00	.00	24	51	12	.09	.00	.00	.15
6	.00	.00	.00	.00	.00	14	40	11	.17	.00	.00	.11
7	.00	.00	.00	.00	.00	12	34	10	.14	.00	.00	.02
8	.00	.00	.00	.00	.00	20	32	9.0	.20	.00	.00	.00
9	.00	.00	.00	.00	.00	60	31	7.9	.10	.00	.00	.00
10	.00	.00	.00	.00	.00	64	31	6.9	.06	.00	.03	.00
11	.00	.00	.00	.00	.00	70	32	6.3	.04	.00	.32	.00
12	.00	.00	.00	.00	.00	77	30	5.9	.04	.00	.26	.00
13	.00	.00	.00	.00	.00	85	27	4.6	.03	.00	.14	.00
14	.00	.00	.00	.00	.00	78	24	4.3	.01	.00	.08	.00
15	.00	.00	.00	.00	.00	70	22	3.6	.00	.00	.03	.00
16	.00	.00	.00	.00	.00	60	21	2.8	.00	.00	.01	.00
17	.00	.00	.00	.00	.00	50	21	2.4	.00	.00	.00	.00
18	.00	.00	.00	.00	.00	45	20	1.5	.00	.00	.00	.07
19	.00	.00	.00	.00	.00	37	19	1.1	.00	.00	.00	1.6
20	.00	.00	.00	.00	.00	31	18	.89	.00	.00	.00	1.3
21	.00	.00	.00	.00	.00	27	18	.65	.00	.00	.00	1.1
22	.00	.00	.00	.00	.00	24	18	.43	.00	.00	.00	1.2
23	.00	.00	.00	.00	.00	23	17	.31	.00	.00	.00	1.1
24	.00	.00	.00	.00	9.2	21	17	.24	.00	.00	.00	1.0
25	.00	.00	.00	.00	11	21	16	.21	.00	.00	.00	2.0
26	.00	.00	.00	.00	7.1	22	16	.33	.00	.00	.00	5.5
27	.00	.00	.00	.00	4.9	22	17	.34	.00	.00	.00	6.6
28	.00	.00	.00	.00	4.2	24	17	.11	.00	.00	.00	5.5
29	.00	.00	.00	.00	---	32	17	.05	.00	.00	1.4	4.2
30	.00	.00	.00	.00	---	28	17	.01	.00	.00	2.8	3.7
31	.00	---	.00	.00	---	26	---	.02	---	.00	.81	---
TOTAL	.00	.00	.00	.00	36.40	1112.9	796	150.89	1.55	.00	5.88	36.47
MEAN	.000	.000	.000	.000	1.30	35.9	26.5	4.87	.052	.000	.19	1.22
MAX	.00	.00	.00	.00	11	85	56	16	.24	.00	2.8	6.6
MIN	.00	.00	.00	.00	.00	3.4	16	.01	.00	.00	.00	.00
CFSM	.000	.000	.000	.000	.01	.36	.26	.05	.001	.000	.002	.01
IN.	.00	.00	.00	.00	.01	.41	.29	.06	.00	.00	.00	.01

CAL YR 1976 TOTAL 42296.36 MEAN 116 MAX 1360 MIN .00 CFSM 1.15 IN 15.58
WTR YR 1977 TOTAL 2140.09 MEAN 5.86 MAX 85 MIN .00 CFSM .06 IN .79

04143900 SHIAWASSEE RIVER AT LINDEN, MI

LOCATION.--Lat 42°48'56", long 83°48'08", in SW¼ sec.19, T.5 N., R.6 E., Genesee County, Hydrologic Unit 04080203, on right bank at upstream side of bridge on Hogan Road, 1.0 mi (1.6 km) west of Linden.

DRAINAGE AREA.--81.2 mi² (210.3 km²).

PERIOD OF RECORD.--October 1967 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (259 m) from topographic map.

REMARKS.--Records good except those for the winter period, which are fair. Low flow regulated at times by lakes above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--10 years, 64.5 ft³/s (1.827 m³/s), 10.79 in/yr (274 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 476 ft³/s (13.5 m³/s) Apr. 22, 1975, gage height, 7.43 ft (2.265 m); minimum, 0.74 ft³/s (0.021 m³/s) May 22, 23, 1971; minimum gage height, 2.82 ft (0.860 m) Aug. 2, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 184 ft³/s (5.21 m³/s) Apr. 6, gage height, 5.76 ft (1.756 m); minimum, 2.2 ft³/s (0.062 m³/s) May 19, 20, gage height, 3.04 ft (0.927 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	23	34	45	35	30	79	118	108	16	26	11	10
2	25	28	55	35	30	81	130	103	16	26	11	11
3	25	27	60	35	30	94	133	93	15	25	12	10
4	25	27	65	35	30	104	136	84	14	25	13	10
5	26	28	65	35	30	113	156	79	15	25	13	10
6	39	37	65	35	30	111	165	56	17	24	13	9.7
7	57	49	65	35	30	109	150	10	17	23	13	9.4
8	64	51	70	35	30	109	146	15	18	19	13	9.1
9	61	52	65	35	30	111	140	19	19	5.2	13	8.4
10	65	52	65	35	30	112	137	24	19	5.2	16	8.1
11	65	50	60	35	32	118	131	26	20	5.6	17	8.1
12	64	49	55	35	33	130	117	28	21	6.1	17	7.5
13	62	49	50	35	34	132	110	28	21	6.3	17	11
14	56	49	35	35	35	134	100	26	21	6.4	17	11
15	53	48	29	35	37	146	71	25	21	6.5	15	12
16	52	47	31	32	38	147	102	24	21	6.8	15	14
17	48	45	33	32	38	144	78	22	21	7.2	14	15
18	46	34	39	32	38	140	73	14	24	9.0	13	15
19	47	26	38	32	38	129	75	2.7	23	10	12	17
20	47	22	39	32	38	123	74	2.5	22	9.8	13	18
21	46	23	40	32	36	122	70	3.2	23	9.9	13	20
22	46	24	40	32	35	121	67	4.2	23	9.4	11	21
23	46	28	40	32	36	117	62	5.2	23	8.6	9.7	23
24	45	32	40	32	51	108	58	5.8	23	8.3	10	34
25	42	33	40	32	54	105	62	7.0	25	8.8	9.4	59
26	36	35	38	30	56	100	79	8.8	26	7.9	8.8	55
27	34	38	35	30	59	91	98	12	25	7.5	8.8	52
28	34	35	35	30	67	95	111	13	25	7.2	8.4	52
29	34	35	35	30	---	107	111	16	28	8.2	9.1	51
30	34	40	35	30	---	114	110	16	26	11	9.4	51
31	36	---	35	30	---	116	---	16	---	12	8.8	---
TOTAL	1383	1127	1442	1025	1055	3562	3170	896.4	628	375.9	384.4	642.3
MEAN	44.6	37.6	46.5	33.1	37.7	115	106	28.9	20.9	12.1	12.4	21.4
MAX	65	52	70	35	67	147	165	108	28	26	17	59
MIN	23	22	29	30	30	79	58	2.5	14	5.2	8.4	7.5
CFSM	.55	.46	.57	.41	.46	1.42	1.31	.36	.26	.15	.15	.26
IN.	.63	.52	.66	.47	.48	1.63	1.45	.41	.29	.17	.18	.29

CAL YR 1976 TOTAL 29061.0 MEAN 79.4 MAX 286 MIN 12 CFSM .98 IN 13.31
WTR YR 1977 TOTAL 15691.0 MEAN 43.0 MAX 165 MIN 2.5 CFSM .53 IN 7.19

04144000 SHIAWASSEE RIVER AT BYRON, MI

LOCATION.--Lat 42°49'25", long 83°56'45", in NE¼ NE¼ sec.23, T.5 N., R.4 E., Shiawassee County, Hydrologic Unit 04090105, on left bank at upstream side of highway bridge at Byron, 0.3 mi (0.5 km) downstream from mill dam which is just upstream from Flint River. Shiawassee River.

DRAINAGE AREA.--368 mi² (953 km²).

WATER-DISCHARGE RECORD

PERIOD OF RECORD.--October 1947 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1144: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 811.34 ft (247.357 m) above mean sea level (levels by Michigan Department of Natural Resources). Prior to Oct. 17, 1960, nonrecording gage and crest-stage gage at same site and datum.

REMARKS.--Water-discharge record good except those for the winter period, which are fair. Low flow slightly regulated at time by mills above station.

AVERAGE DISCHARGE.--30 years, 254 ft³/s (7.193 m³/s), 9.37 in/yr (238 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,880 ft³/s (110 m³/s) Apr. 22, 1975, gage height, 15.23 ft (4.640 m); minimum, 19 ft³/s (0.54 m³/s), Aug. 10, 1965; minimum gage height, 3.55 ft (1.082 m) Sept. 10, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 829 ft³/s (23.5 m³/s) Apr. 1, gage height, 7.93 ft (2.417 m); minimum, [illegible] (0.74 m³/s) Sept. 8, 9, gage height, 5.97 ft (1.820 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	101	215	171	120	105	290	822	503	78	105	68	62
2	97	230	190	120	105	310	785	474	80	104	65	65
3	95	224	195	120	105	350	742	430	78	95	69	68
4	91	184	169	120	105	430	721	410	78	87	58	63
5	91	135	169	120	110	488	741	403	74	84	55	61
6	114	122	169	120	110	560	705	387	78	85	51	56
7	175	119	170	120	110	614	719	366	84	82	49	52
8	254	118	160	120	110	562	637	358	84	80	48	50
9	267	122	160	120	110	494	562	142	77	76	48	47
10	217	126	160	120	110	498	489	134	78	68	54	49
11	156	127	150	120	110	504	430	136	77	59	54	50
12	149	130	147	120	120	623	419	124	79	59	71	49
13	137	136	144	120	130	630	383	120	86	67	73	47
14	132	137	139	120	140	621	357	108	90	57	71	70
15	131	130	125	110	150	602	342	108	84	50	67	68
16	128	128	120	110	150	551	320	108	78	57	66	57
17	127	139	112	110	150	524	304	104	77	57	71	104
18	129	150	120	110	150	490	270	99	67	60	78	143
19	116	161	127	110	150	429	234	102	106	61	90	177
20	123	155	131	110	140	469	299	91	179	62	85	174
21	129	150	140	110	140	384	198	83	168	62	80	150
22	131	143	140	110	140	360	191	95	148	78	69	170
23	136	143	140	110	150	370	234	85	138	73	63	190
24	137	143	140	110	200	454	303	82	130	68	70	119
25	129	145	135	110	230	429	429	85	138	66	91	118
26	125	147	130	110	260	413	538	96	124	63	67	109
27	123	147	130	110	270	380	683	93	123	63	65	133
28	119	142	129	110	270	361	765	93	104	67	62	130
29	114	140	120	105	---	473	748	88	102	66	61	104
30	115	141	120	105	---	569	688	87	100	69	61	100
31	157	---	120	105	---	759	---	87	---	71	61	---
TOTAL	4225	4565	4454	3535	4130	14979	15689	9291	3834	2171	2107	2814
MEAN	136	152	144	114	148	483	523	171	091	70.0	68.0	94.1
MAX	267	230	195	120	270	759	822	503	179	106	73	190
MIN	91	118	112	105	105	290	198	82	74	48	47	47
CFSM	.37	.41	.39	.31	.40	1.31	1.27	.47	.47	.19	.18	.26
IN.	.43	.46	.45	.36	.42	1.51	1.59	.48	.39	.22	.21	.28

CAL YR 1976 TOTAL 121167 MEAN 331 MAX 1760 MIN 54 CFSM .90 IN 12.25
WTR YR 1977 TOTAL 66070 MEAN 181 MAX 822 MIN 27 CFSM .49 IN 6.68

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Water years 1962 to current year.

INSTRUMENTATION.--Temperature recorder since March 1962.

REMARKS.--Interruptions in the record were due to malfunctions of the recorder.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 29.0°C on several days in 1971, 1978 and 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 26.0°C July 25; minimum, 0.0°C on many days during winter period.

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	19.0	13.5	9.0	6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
2	18.5	14.0	9.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
3	17.0	13.0	9.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
4	17.0	13.5	9.0	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
5	17.5	14.5	6.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
6	17.5	14.5	6.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
7	18.0	12.5	6.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
8	12.5	11.0	3.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
9	13.0	11.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5
10	14.5	12.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	13.0	10.5	2.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	12.0	11.0	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
13	12.0	10.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
14	12.0	11.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0
15	11.0	10.5	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	10.5	9.5	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	9.0	8.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	8.0	8.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
19	7.0	6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	6.5	6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	8.0	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	8.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	9.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	9.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	9.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	9.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	9.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	9.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	9.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	9.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	9.0	8.0	----	----	0.0	0.0	0.0	0.0	----	----	10.0	10.0
MONTH	19.0	0.0	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0

04144000 SHIAWASSEE RIVER AT BYRON, MI--CONTINUED

TEMPERATURE (DEG. F) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	50.0	0.0	59.0	39.0	70.0	59.0	71.5	59.5	84.0	71.5	73.5	59.5
2	0.0	7.5	57.0	39.0	69.5	58.0	71.5	59.5	84.0	71.0	69.5	59.0
3	0.0	0.0	57.0	39.0	70.0	59.0	71.5	59.5	82.0	71.0	69.5	57.5
4	0.0	0.0	57.0	37.0	69.5	57.5	72.5	59.5	83.5	71.0	68.5	56.5
5	0.0	0.0	59.0	39.0	71.0	60.0	74.0	63.0	84.0	72.0	68.0	57.0
6	0.0	0.0	58.0	37.5	71.0	58.0	75.0	63.5	84.0	73.0	72.0	64.0
7	0.0	0.0	59.0	37.0	70.0	57.0	80.0	64.0	83.0	67.5	72.0	59.5
8	0.0	0.0	58.0	36.0	68.0	56.5	80.0	63.5	81.5	69.0	71.0	59.0
9	0.0	0.0	59.5	38.0	70.5	58.5	76.5	63.5	81.5	69.0	72.0	59.5
10	50.5	0.0	58.0	40.0	70.0	58.0	75.0	61.5	84.0	69.5	69.0	58.5
11	59.0	55.0	69.0	50.0	69.5	57.0	80.0	61.0	78.0	61.0	68.0	51.0
12	58.5	56.0	67.0	49.0	67.5	57.5	73.5	52.0	80.0	60.0	66.0	51.0
13	61.0	59.0	70.0	50.0	69.0	58.0	80.5	63.0	83.0	61.0	71.0	51.0
14	59.5	59.0	71.0	49.0	68.5	57.0	80.0	63.0	84.0	62.0	71.0	58.5
15	58.0	56.0	69.0	48.0	68.0	56.0	81.5	65.0	84.0	61.0	69.0	55.0
16	59.0	55.0	69.0	48.0	69.0	57.0	80.0	64.0	83.0	61.0	68.0	51.0
17	58.0	55.0	69.0	48.0	68.0	56.0	80.0	64.0	83.0	61.0	68.0	53.5
18	58.0	55.0	69.0	48.0	68.0	56.0	80.0	64.0	83.0	61.0	68.0	53.5
19	58.0	55.0	69.0	48.0	68.0	56.0	80.0	64.0	83.0	61.0	68.0	53.5
20	58.0	54.0	69.0	47.0	68.0	56.0	80.0	64.0	83.0	61.0	----	----
21	55.0	51.0	66.0	45.0	65.0	54.0	77.0	60.0	80.0	58.0	----	----
22	56.0	51.0	66.0	45.0	65.0	54.0	77.0	60.0	80.0	58.0	----	----
23	56.0	51.0	66.0	45.0	65.0	54.0	77.0	60.0	80.0	58.0	----	----
24	56.0	51.0	66.0	45.0	65.0	54.0	77.0	60.0	80.0	58.0	----	----
25	56.0	51.0	66.0	45.0	65.0	54.0	77.0	60.0	80.0	58.0	----	----
26	56.0	51.0	66.0	45.0	65.0	54.0	77.0	60.0	80.0	58.0	----	----
27	56.0	51.0	66.0	45.0	65.0	54.0	77.0	60.0	80.0	58.0	----	----
28	56.0	51.0	66.0	45.0	65.0	54.0	77.0	60.0	80.0	58.0	----	----
29	----	----	66.0	45.0	----	----	77.0	60.0	80.0	58.0	----	----
30	56.0	0.0	67.0	46.0	65.0	54.0	80.0	63.0	80.0	58.0	80.0	58.0

04144500 SHIAWASSEE RIVER AT OWOSSO, MI

LOCATION.--Lat 43°00'16", long 84°10'57", in SW¼ sec.12, T.7 N., R.2 E., Shiawassee County, Hydrologic Unit 04080203, on right bank on grounds of sewage-treatment plant, 1.5 mi (2.4 km) north of Owosso.

DRAINAGE AREA.--538 mi² (1,393 km²).

PERIOD OF RECORD.--March 1951 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height record for flood seasons collected in this vicinity 1904, 1910-30 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1307: 1949(M). WSP 1337: 1952, 1954, 1956-58, 1961.

GAGE.--Water-stage recorder. Datum of gage is 707.25 ft (215.570 m) above mean sea level. Prior to Oct. 15, 1953, at site 1.5 mi (2.4 km) upstream at datum 5.69 ft (1.660 m) higher.

REMARKS.--Records good except those for winter period, which are fair. Flow regulated below about 800 ft³/s (22.7 m³/s) by power-plant at Shiawassee Dam prior to February 1953; occasional regulation at low stages since. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--40 years, 800 ft³/s (9.586 m³/s), 8.33 in/yr (212 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,260 ft³/s (177 m³/s) Apr. 6, 1947, gage height, 10.35 ft (3.155 m); minimum, 0.2 ft³/s (0.006 m³/s) July 27, 1958, gage height, 1.12 ft (0.341 m); minimum daily, 2.8 ft³/s (0.057 m³/s) July 28, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,310 ft³/s (37.1 m³/s) Apr. 5, gage height, 5.12 ft (1.561 m), no peak above base of 1,500 ft³/s (42.5 m³/s); minimum, 30 ft³/s (0.85 m³/s) Sept. 12, gage height, 1.38 ft (0.591 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1,04	1,01	1,50	1,55	1,61	2,05	5,04	8,03	82	1,10	5,3	5,2
2	1,04	2,01	2,00	1,50	1,60	6,12	6,51	6,52	85	1,10	5,3	5,0
3	1,04	2,01	2,00	1,55	1,60	6,12	6,51	5,54	90	1,10	5,4	4,6
4	1,04	2,01	2,00	1,55	1,61	6,10	5,67	7,52	86	1,09	6,0	4,2
5	1,04	2,01	1,90	1,55	1,61	6,10	5,63	9,26	80	1,05	6,4	4,2
6	1,04	2,01	1,90	1,55	1,61	6,10	5,63	1,043	9,26			
7	1,06	2,01	1,90	1,55	1,61	6,10	6,63	11,93	1,04	96	6,6	4,2
8	1,01	1,71	1,90	1,55	1,61	7,10	7,10	13,03	4,09	97	6,3	4,3
9	1,04	1,74	1,90	1,55	1,61	7,10	7,10	8,06	3,47	93	5,8	5,0
10	1,04	1,04	1,90	1,55	1,61	7,10	7,10	6,66	2,26	1,02	5,2	4,8
11	1,04	1,04	1,90	1,55	1,61	6,10	6,63	5,61	1,52	1,02	4,8	4,2
12	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
13	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
14	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
15	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
16	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
17	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
18	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
19	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
20	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
21	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
22	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
23	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
24	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
25	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
26	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
27	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
28	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
29	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
30	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
31	1,04	1,04	1,90	1,55	1,61	6,10	6,63	4,78	1,04	85	4,5	4,1
TOTAL	32,000	31,000	59,000	47,000	47,000	189,000	207,000	207,000	30,000	30,000	15,000	13,000
MEAN	1,032	1,033	1,903	1,516	1,679	6,097	6,900	6,677	1,000	968	484	433
MAX	1,060	2,010	2,000	1,550	1,610	7,100	13,030	13,030	9,260	1,100	6,600	5,200
MIN	1,010	1,010	1,900	1,550	1,610	6,100	5,630	4,780	1,040	850	4,500	4,100
AC-FT	63,500	61,500	117,000	93,200	93,200	375,000	411,000	411,000	59,500	59,500	29,800	25,800
CFSM	1,92	1,92	3,54	2,82	3,12	11,33	12,83	12,41	1,86	1,80	,90	,81
IN.	2,21	2,14	4,08	3,25	3,25	13,08	14,30	14,30	2,07	2,07	1,03	,90

CAL YR 1970 TOTAL 122,000 MEAN 334 MAX 1,060 MIN 1,010 AC-FT 242,000 CFSM ,62 IN. 8,44
WTR YR 1971 TOTAL 511,000 MEAN 1,400 MAX 13,030 MIN 850 AC-FT 1,014,000 CFSM 2,60 IN. 35,36

04145000 SHIAWASSEE RIVER NEAR FERGUS, MI

LOCATION.--Lat 43°15'17", long 84°06'20", in sec.22, T.10 N., R.3 E., Saginaw County, Hydrologic Unit 04080203, on right bank at downstream side of county highway bridge, 1.2 mi (1.9 km) east of Fergus, 1.8 mi (2.9 km) upstream from Bear Creek, and 14 mi (22 km) above mouth.

DRAINAGE AREA.--637 mi² (1,650 km²).

PERIOD OF RECORD.--October 1939 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1337: 1940(M), 1941-42, 1943(M), 1944, 1945(M), 1946, 1947(M), 1948, 1950. WSP 1627: 1952, 1954(M), 1957.

GAGE.--Water-stage recorder. Datum of gage is 585.80 ft (178.552 m) above mean sea level. Prior to Aug. 22, 1968, nonrecording gage at same site and datum. Prior to Oct. 1, 1970, at datum 2.00 ft (0.610 m) higher.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation at low stages by powerplant above Owosso prior to February 1953; occasional regulation at low stages since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--50 years, 421 ft³/s (11.92 m³/s), 8.98 in/yr (228 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,500 ft³/s (212 m³/s) Apr. 6, 1947 (includes overflow bypassing gage); maximum gage height, 15.84 ft (4.706 m), present datum, Mar. 29, 1960; minimum discharge, 27 ft³/s (0.76 m³/s) Aug. 8, 1966; minimum gage height, 1.78 ft (0.543 m) Sept. 1, 5-9, 10, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,260 ft³/s (35.7 m³/s) Apr. 6, gage height, 6.40 ft (1.951 m); maximum gage height, 7.55 ft (2.301 m) Mar. 9, backwater from ice; minimum discharge, 52 ft³/s (1.47 m³/s) Sept. 4, 5-9, 10, gage height, 1.78 ft (0.543 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	174	170	140	130	530	941	864	194	144	59	60	
2	170	170	140	130	450	938	794	193	127	56	61	
3	166	170	140	130	400	1040	822	189	124	55	62	
4	162	170	140	130	365	978	963	180	123	58	65	
5	158	170	140	130	340	1070	907	186	120	60	67	
6	154	170	140	130	320	1230	981	159	119	59	62	
7	150	170	140	130	300	1070	877	152	124	59	62	
8	150	170	140	130	280	958	828	135	98	58	62	
9	154	170	140	130	260	868	844	114	103	71	62	
10	154	170	140	130	240	769	794	116	91	70	58	
11	154	170	140	130	220	697	730	187	85	67	61	
12	150	170	140	130	210	661	734	184	82	71	63	
13	146	170	140	130	200	637	718	182	77	64	63	
14	142	170	140	130	190	613	698	168	150	71	69	
15	138	170	140	130	180	597	682	184	83	66	64	
16	134	170	140	130	170	580	670	182	87	70	58	
17	130	170	140	130	160	565	658	185	86	71	107	
18	126	170	140	130	150	549	646	182	83	71	154	
19	122	170	140	130	140	534	634	178	83	69	192	
20	118	170	140	130	130	518	622	178	78	66	204	
21	114	170	140	130	120	502	610	176	80	64	202	
22	110	170	140	130	110	486	598	174	77	61	194	
23	106	170	140	130	100	470	586	172	74	61	186	
24	102	170	140	130	90	454	574	170	72	61	178	
25	98	170	140	130	80	438	562	168	70	61	170	
26	94	170	140	130	70	422	550	166	68	61	162	
27	90	170	140	130	60	406	538	164	66	61	154	
28	86	170	140	130	50	390	526	162	64	61	146	
29	82	170	140	130	40	374	514	160	62	61	138	
30	78	170	140	130	30	358	502	158	60	61	130	
31	174		140	130		342		156		61	122	
TOTAL												
MEAN												
MAX												
MIN												
CFSM												
IN.												

04146000 FARMERS CREEK NEAR LAPEER, MI

LOCATION.--Lat 43°02'41", long 83°20'14", in sec.6, T.7 N., R.10 E., Lapeer County, Hydrologic Unit 04080204, on left bank at sewage-treatment plant at Michigan Home and Training School, 2.0 mi (3.2 km) west of Lapeer.

DRAINAGE AREA.--55.2 mi² (143.0 km²).

PERIOD OF RECORD.--October 1932 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 924: 1940. WSP 1084: 1942(M), 1943. WSP 1337: 1934-38, 1940(M), 1944(M), 1945, 1946(M), 1948-51(M). WSP 1727: 1952(M). WRD MI-71: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 805.79 ft (245.605 m) above mean sea level. Prior to May 25, 1954, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Prior to 1941, occasional regulation by dam above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--45 years, 30.1 ft³/s (0.852 m³/s), 7.41 in/yr (188 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,280 ft³/s (36.2 m³/s) Apr. 6, 1947, gage height, 19.87 ft (6.056 m), from flood-mark, from rating curve extended above 660 ft³/s (18.7 m³/s) on basis of contracted-opening measurement of peak flow; minimum not determined.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 90 ft³/s (2.55 m³/s) Feb. 26, gage height, 16.12 ft (4.913 m), no peak above base of 160 ft³/s (4.53 m³/s); minimum, 0.90 ft³/s (0.025 m³/s) July 28, 29, gage height, 14.00 ft (4.500 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

Day	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	24	18	16	19	61	66	19	4.2	8.1	7.1	3.5
2	18	36	18	15	19	48	69	14	5.3	6.6	7.3	4.4
3	9.6	30	16	15	19	37	78	14	5.0	5.6	3.2	4.7
4	9.2	32	16	15	19	46	66	15	5.0	5.6	3.4	4.7
5	9.2	27	16	15	19	49	73	16	5.3	5.6	4.7	4.7
6	19	25	18	19	19	53	60	18	7.3	5.3	5.3	4.6
7	18	24	19	19	19	56	66	16	8.1	5.8	5.6	3.8
8	18	27	19	19	19	57	62	9.2	6.1	6.8	5.6	3.5
9	18	30	19	19	19	62	57	8.8	6.1	5.9	5.9	3.5
10	18	29	19	19	19	65	51	8.2	7.3	5.8	6.2	3.7
11	18	25	21	19	19	68	48	9.9	7.8	5.8	6.2	3.8
12	16	27	21	19	19	72	42	9.9	7.8	5.8	6.2	3.5
13	16	27	21	19	19	74	38	9.3	7.8	5.8	5.9	3.6
14	19	29	19	19	19	73	33	8.8	8.8	6.7	5.3	3.6
15	24	29	19	16	18	70	33	8.8	8.8	6.8	6.7	3.9
16	18	28	19	19	19	65	33	8.7	8.8	6.1	6.7	3.8
17	16	26	19	19	19	62	33	8.6	8.8	6.1	6.7	3.8
18	16	25	19	19	19	59	33	8.6	8.8	6.1	6.7	3.8
19	16	25	19	19	19	56	33	8.6	8.8	6.1	6.7	3.8
20	16	25	19	19	19	53	33	8.6	8.8	6.1	6.7	3.8
21	16	25	19	19	19	50	33	8.6	8.8	6.1	6.7	3.8
22	16	25	19	19	19	47	33	8.6	8.8	6.1	6.7	3.8
23	16	25	19	19	19	44	33	8.6	8.8	6.1	6.7	3.8
24	16	25	19	19	19	41	33	8.6	8.8	6.1	6.7	3.8
25	16	25	19	19	19	38	33	8.6	8.8	6.1	6.7	3.8
26	16	25	19	19	19	35	33	8.6	8.8	6.1	6.7	3.8
27	16	25	19	19	19	32	33	8.6	8.8	6.1	6.7	3.8
28	16	25	19	19	19	29	33	8.6	8.8	6.1	6.7	3.8
29	16	25	19	19	19	26	33	8.6	8.8	6.1	6.7	3.8
30	16	25	19	19	19	23	33	8.6	8.8	6.1	6.7	3.8
31	16		19	19		21		8.6		6.1	6.7	

04147000 HOLLOWAY RESERVOIR NEAR OTISVILLE, MI

LOCATION.--Lat 43°07'15", long 83°29'45", in NW¼ sec.11, T.8 N., R.8 E., Genesee County, Hydrologic Unit 04080204, in gatehouse on right side of Holloway Dam on Flint River, 3.5 mi (5.6 km) southeast of Otisville.

DRAINAGE AREA.--526 mi² (1,362 km²).

PERIOD OF RECORD.--March 1954 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is at mean sea level (levels by city of Flint).

REMARKS.--Reservoir is formed by an earth-fill dam with concrete spillway completed in 1953. Capacity of reservoir, 1,256,000,000 cu ft (35.6 hm³) at elevation 760.00 ft (231.65 m). The spillway section includes two 90 foot (27.4 m) drum gates with minimum crest elevation of 751 ft (228.9 m), maximum at 755 ft (230.1 m), three 20-foot (6.1 m) radial gates with sill elevation of 745 ft (227.1 m), and 2 sluices (each 4 by 6 ft), one on each side with valve controls. Entrance elevation of sluiceways is 724 ft (220.7 m). Reservoir is used to regulate flow for sewage dilution for city of Flint.

COOPERATION.--Reservoir elevations furnished by city of Flint.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 996,000,000 cu ft (28.2 hm³) Mar. 8, 1956, elevation, 757.4 ft (230.86 m); minimum, reservoir empty at times during October, November, 1954, January, February, 1955, October, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 669,000,000 cu ft (18.9 hm³) Sept. 30, elevation, 753.78 ft (229.75 m); minimum, 176,000,000 cu ft (4.98 hm³) May 2, elevation, 744.72 ft (226.99 m).

MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

Date	Elevation (feet)	Contents (millions of cubic feet)	Change in contents during month: Millions of cubic feet	Change in contents during month: Equivalent in ft³/s
Sept. 30	752.47	570	--	--
Oct. 31	752.61	580	+10	+3.7
Nov. 30	751.38	496	+84	+32.4
Dec. 31	751.29	490	+6	+2.2
CAL YR 1976	--	--	+387	+8.7
Jan. 31	751.24	489	-1	-0.4
Feb. 28	751.69	515	+26	+10.7
Mar. 31	751.39	496	-19	-7.1
Apr. 30	744.80	178	-318	-123
May 31	745.00	305	+127	+47.6
June 30	750.04	615	+310	+62.6
July 31	750.62	668	+53	+19.8
Aug. 31	751.33	504	+36	+13.6
Sept. 30	753.78	669	+165	+63.7
WTR YR 1977	--	--	+99	+3.1

04147500 FLINT RIVER NEAR OTISVILLE, MI

LOCATION.--Lat 43°06'40", long 83°31'10", in SE¼ sec.9, T.8 N., R.8 E., Genesee County, Hydrologic Unit 04080204, on left bank 20 ft (6 m) downstream from bridge on State Highway 15, 1.5 mi (2.4 km) downstream from Holloway Reservoir, 3.5 mi (5.6 km) upstream from Powers-Cullen drain, and 3.8 mi (6.1 km) south of Otisville.

DRAINAGE AREA.--531 mi² (1,375 km²).

PERIOD OF RECORD.--October 1952 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 721.39 ft (219.880 m) above mean sea level.

REMARKS.--Records good. Flow regulated by Holloway Reservoir, 1.5 mi (2.4 km) above station (see preceding page). Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--25 years, 293 ft³/s (8.298 m³/s), 7.49 in/yr (190 mm/yr), adjusted for storage since 1954.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,150 ft³/s (174 m³/s) Apr. 1, 1960, gage height, 14.97 ft (4.563 m); minimum, 2.1 ft³/s (0.059 m³/s) Oct. 11, 17, 1971, gage height, 1.57 ft (0.479 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 987 ft³/s (28.0 m³/s) Mar. 13, 14, gage height, 7.56 ft (2.304 m); minimum, 7.4 ft³/s (0.21 m³/s) July 1, 2, gage height, 1.84 ft (0.561 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	83	178	142	110	97	345	629	233	71	9.2	28	26
2	83	178	150	107	97	483	645	140	11	9.2	26	26
3	87	178	146	105	100	457	641	11	11	9.2	25	26
4	87	178	134	105	99	427	719	11	11	9.2	21	26
5	92	178	131	105	100	495	743	62	12	13	13	26
6	97	178	126	105	99	545	787	145	13	9.5	13	51
7	94	178	131	105	97	575	813	145	12	10	12	95
8	94	178	126	105	100	607	765	145	12	9.5	12	94
9	94	218	123	105	100	753	687	91	12	10	12	94
10	94	269	121	110	99	917	659	10	12	15	13	94
11	107	266	116	105	102	939	653	10	12	23	13	94
12	124	266	116	102	107	961	651	10	12	60	13	94
13	123	265	116	100	123	983	723	11	12	105	13	94
14	123	263	116	102	123	979	795	11	13	107	15	94
15	124	262	113	102	124	939	773	10	13	107	43	92
16	123	265	113	100	126	857	751	10	60	107	94	94
17	123	184	115	100	128	837	729	10	100	107	62	92
18	123	10	115	104	124	797	687	10	66	107	61	94
19	123	34	116	100	124	687	663	11	12	94	61	95
20	124	74	123	100	124	627	567	11	12	79	61	94
21	123	84	126	100	124	577	672	11	12	73	61	95
22	123	42	124	100	124	561	674	11	12	66	50	95
23	123	105	126	102	126	653	675	11	13	57	50	95
24	124	115	124	102	130	669	674	11	13	57	50	95
25	124	120	121	104	123	661	528	11	12	61	43	97
26	144	120	121	105	274	611	613	11	13	55	44	99
27	161	147	123	105	310	565	633	17	12	55	44	100
28	161	154	120	105	361	552	635	24	12	55	44	137
29	161	170	118	102	---	611	620	10	14	55	50	216
30	170	170	116	102	---	535	610	61	19	47	50	200
31	170	---	113	98	---	567	---	60	---	45	50	---
TOTAL	3774	5219	3836	3241	3050	17440	19320	1488	1445.0	1135	1025	2814
MEAN	122	174	124	105	109	563	644	48.0	48.2	36.6	33.1	93.8
MAX	170	269	150	110	361	939	813	233	100	107	94	200
MIN	83	10	113	98	97	345	528	10	10	9.2	12	26
AC-FT	7480	10350	7610	6430	6050	34590	38320	2950	2870	2250	2030	5580
CFSM	.23	.33	.23	.20	.21	1.06	1.21	.09	.09	.07	.06	.18
IN.	.26	.37	.27	.23	.24	1.22	1.40	.10	.10	.08	.07	.20

e Estimated (no change in conditions is believed).

04147990 BUTTERNUT CREEK NEAR GENESEE, MI

LOCATION.--Lat 43°08'09", long 83°35'57", in NE¼ NE¼ sec.2, T.8 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft (3 m) downstream from bridge on Frances Road, 2.3 mi (3.7 km) upstream from mouth, and 2.0 mi (3.2 km) northeast of Genesee.

DRAINAGE AREA.--34.5 mi² (89.4 km²).

PERIOD OF RECORD.--January 1970 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 730 ft (223 m) from topographic map (nearest 10 ft). Prior to June 11, 1970, non-recording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--7 years, 22.7 ft³/s (0.643 m³/s), 8.94 in/yr (227 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 533 ft³/s (15.1 m³/s) May 17, 1974, gage height, 8.21 ft (2.502 m); maximum gage height, 8.68 ft (2.646 m) Dec. 31, 1972; minimum discharge, 1.2 ft³/s (0.034 m³/s) Dec. 1, 1971, result of freezeup; minimum gage height, 1.48 ft (0.451 m) July 23, 27, 28, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 151 ft³/s (4.28 m³/s) Mar. 29, gage height, 5.78 ft (1.762 m), no peak above base of 200 ft³/s (5.66 m³/s); minimum, 1.8 ft³/s (0.051 m³/s) July 23, 27, 28, gage height, 1.48 ft (0.451 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.7	6.5	4.5	4.5	3.6	9.0	48	9.3	3.7	6.4	2.3	3.6
2	3.5	6.1	4.5	4.3	3.6	8.0	48	8.5	3.7	5.0	2.2	4.4
3	3.6	5.8	4.5	4.0	3.6	7.5	39	8.8	3.4	4.1	2.5	4.2
4	3.8	5.6	4.5	4.0	3.8	28	41	9.4	3.2	3.8	3.0	3.7
5	3.9	5.3	4.5	3.7	3.8	58	90	8.5	3.2	7.6	3.2	5.5
6	9.1	5.2	4.5	3.5	3.8	27	46	7.5	4.8	4.8	3.2	5.7
7	10	5.4	4.6	3.5	3.8	26	37	6.8	4.3	3.8	2.9	4.4
8	6.9	4.9	4.6	3.5	3.8	28	31	6.3	3.8	2.9	2.8	3.6
9	4.6	4.7	4.5	3.5	3.8	35	26	6.1	3.5	3.8	2.6	3.2
10	5.0	4.9	4.5	3.5	3.8	38	23	5.8	3.2	5.1	3.6	3.0
11	5.3	4.6	4.5	3.5	3.8	31	20	5.7	3.2	3.9	3.0	2.9
12	5.0	4.5	4.5	3.5	3.7	31	18	5.4	3.2	3.5	2.6	2.8
13	5.0	4.5	4.5	3.5	3.7	34	16	5.1	3.2	3.1	2.4	3.4
14	5.1	4.6	4.5	3.5	3.7	28	14	4.8	3.0	2.8	16	4.2
15	4.9	4.4	4.5	3.7	3.7	25	13	4.6	2.9	2.6	4.9	4.9
16	4.8	4.3	4.5	3.8	3.7	23	13	4.5	2.6	2.5	3.4	4.2
17	4.9	4.4	4.5	3.8	4.8	19	13	4.3	2.6	2.6	3.0	4.3
18	4.9	4.5	4.5	3.8	4.1	17	12	5.1	29	2.6	2.7	19
19	5.2	4.6	4.5	3.8	4.3	17	11	4.3	5.1	2.6	2.5	31
20	5.5	4.6	4.5	3.7	4.3	16	11	4.1	3.9	2.3	2.5	20
21	5.7	4.5	4.5	3.5	4.5	18	9.8	3.8	3.8	2.2	2.5	11
22	5.6	4.3	4.5	3.4	4.5	20	11	3.6	3.5	2.1	2.8	8.3
23	5.3	4.2	4.5	3.4	9.8	18	16	3.4	3.2	2.1	2.5	7.3
24	5.3	4.3	4.5	3.4	20	16	16	3.4	3.0	2.1	3.2	7.6
25	5.5	4.3	4.5	3.4	15	13	19	3.4	2.9	2.2	4.4	13
26	5.2	5.1	4.5	3.5	12	12	19	3.3	2.7	2.1	4.2	12
27	5.5	7.8	4.5	3.6	10	12	25	3.2	2.6	2.0	3.8	12
28	4.9	7.2	4.5	3.6	9.5	26	13	3.8	2.6	2.0	3.5	8.4
29	5.0	7.5	4.5	3.6	---	110	11	3.9	37	2.2	3.4	7.0
30	5.1	5.9	4.5	3.6	---	95	10	3.9	8.1	2.3	3.3	6.5
31	5.2	---	4.5	3.6	---	67	---	3.8	---	2.4	3.2	---
TOTAL	163.4	153.6	139.7	113.2	160.9	830.5	603.8	168.6	102.8	97.9	100.1	234.9
MEAN	5.27	5.12	4.51	3.65	5.75	27.8	20.1	5.44	3.43	3.16	3.49	7.83
MAX	10	7.8	4.6	4.5	20	110	90	9.4	37	7.6	16	31
MIN	3.5	4.2	4.5	3.4	3.6	7.5	9.8	3.2	2.6	2.0	2.4	2.8
CFSM	.15	.15	.13	.11	.17	.81	.58	.16	.10	.09	.10	.23
IN.	.18	.17	.15	.12	.17	.90	.65	.18	.11	.10	.11	.25

CAL YR 1976 TOTAL 11710.6 MEAN 32.0 MAX 295 MIN 2.0 CFSM .93 IN 12.63
WTR YR 1977 TOTAL 1607.2 MEAN 4.39 MAX 110 MIN 2.0 CFSM .13 IN 1.86

04148140 KEARSLEY CREEK NEAR DAVISON, MI

LOCATION.--Lat 43°02'01", long 83°34'53", in NE¼ sec.12, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft (3 m) upstream from bridge on State Highway 21, 1.4 mi (2.3 km) downstream from Black Creek, and 3.3 mi (5.3 km) west of Davison.

DRAINAGE AREA.--99.6 mi² (258.0 km²).

PERIOD OF RECORD.--October 1965 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 747.39 ft (227.804 m) above mean sea level.

REMARKS.--Records good except those for the winter period, which are poor. Some diurnal fluctuation caused by small dams, and occasional diversion for sprinkler irrigation above station. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.--12 years, 71.9 ft³/s (2.036 m³/s), 9.80 in/yr (249 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,430 ft³/s (40.5 m³/s) Apr. 21, 1975, gage height, 11.32 ft (3.450 m); minimum, 2.7 ft³/s (0.076 m³/s) July 9, 1966; minimum gage height, 2.69 ft (0.820 m) Sept. 12, 1969.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 267 ft³/s (7.56 m³/s) Apr. 5, gage height, 6.77 ft (2.063 m); maximum gage height, 7.09 ft (2.161 m) Mar. 5; backwater from ice; no peak discharge above base of 350 ft³/s (9.91 m³/s); minimum, 3.6 ft³/s (0.10 m³/s) July 28, gage height, 2.77 ft (0.844 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	24	25	22	20	50	182	62	11	10	7.4	8.6
2	18	29	25	21	20	50	175	56	13	15	7.2	11
3	16	33	25	21	20	60	162	52	12	14	13	10
4	15	32	25	20	20	100	157	42	12	13	11	10
5	14	30	25	20	21	190	249	31	18	14	13	9.7
6	55	28	24	20	21	130	213	37	23	12	11	9.8
7	37	26	24	20	21	110	179	38	16	10	11	8.2
8	34	25	24	19	21	120	157	36	15	11	11	7.5
9	30	25	24	19	21	140	137	32	19	21	10	7.2
10	30	24	24	19	21	153	121	29	16	11	14	6.4
11	36	24	24	19	21	140	109	27	15	9.8	11	6.8
12	32	23	24	19	21	143	96	26	15	7.1	11	5.5
13	28	23	24	20	22	153	78	24	14	7.6	10	12
14	25	22	24	20	24	143	71	22	14	6.6	9.9	16
15	22	21	24	20	27	132	71	21	13	6.2	8.4	15
16	20	21	24	21	29	122	68	20	12	6.0	7.4	22
17	19	21	24	21	30	110	60	18	11	5.6	7.2	19
18	17	21	25	21	30	98	53	18	14	11	6.4	27
19	16	21	25	21	30	91	45	17	13	11	6.8	27
20	16	21	30	20	30	85	47	17	17	7.8	7.7	24
21	18	21	24	20	30	79	40	16	16	6.2	7.2	31
22	20	21	25	19	35	64	41	19	12	5.5	10	28
23	21	21	24	19	48	83	50	17	9.5	6.9	7.8	27
24	21	21	24	19	100	79	63	15	8.4	6.4	7.8	27
25	22	21	24	20	80	81	111	14	8.8	9.4	7.8	27
26	22	23	24	20	65	82	100	12	7.6	6.6	7.3	44
27	21	25	24	20	55	71	110	10	7.2	6.3	6.8	34
28	21	27	24	20	50	91	100	9.4	7.3	6.2	6.6	33
29	21	26	23	20	---	200	91	9.2	32	6.6	6.7	30
30	21	25	23	20	---	168	77	8.8	15	6.5	7.6	27
31	20	---	23	20	---	174	---	9.4	---	6.5	7.1	---
TOTAL	796	739	767	620	920	3914	3290	764.0	421.0	274.8	279.9	574.1
MEAN	25.7	24.6	24.7	20.0	32.9	113	110	24.7	14.1	8.86	9.03	19.1
MAX	55	33	30	22	100	200	249	62	30	21	14	44
MIN	14	21	23	19	20	50	40	8.8	7.2	6.2	6.6	5.5
AC-FT	1580	1470	1520	1230	1820	7760	6530	1520	835	545	555	1140
CFSM	.258	.247	.248	.201	.331	1.14	1.10	.248	.142	.089	.091	.193
IN.	.297	.277	.286	.232	.343	1.31	1.23	.286	.157	.102	.105	.215

CAL YR 1976 TOTAL 24484.6 MEAN 67.0 MAX 781 MIN 7.2 AC-FT 48560 CFSM .673 IN 9.13
WTR YR 1977 TOTAL 12697.6 MEAN 34.8 MAX 249 MIN 6.2 AC-FT 25180 CFSM .349 IN 4.80

04148160 GILKEY CREEK NEAR FLINT, MI

LOCATION.--Lat 43°01'27", long 83°37'32", in NW¼ SW¼ sec.10, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 25 ft (8 m) downstream from culvert on extension of Arapaho Street, 5.1 mi (8.2 km) upstream from mouth, and 3.5 mi (5.6 km) east of Flint.

DRAINAGE AREA.--6.29 mi² (16.29 km²).

PERIOD OF RECORD.--January 1970 to current year.

GAGE.--Water-stage recorder. Datum of gage is 747.56 ft (227.856 m) above mean sea level. The figure published in the 1976 report is in error.

REMARKS.--Records fair except those for the winter period and those below 1.0 ft³/s (0.028 m³/s), which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--7 years, 5.27 ft³/s (0.149 m³/s), 11.38 in/yr (289 mm/yr). The figure published in the 1976 report was in error; the correct figure is 6 years, 5.84 ft³/s (0.165 m³/s) 12.61 in/yr (320 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 285 ft³/s (8.07 m³/s) Apr. 19, 1975, gage height, 7.66 ft (2.335 m); no flow on many days during 1970, 1973, 1974, 1975, 1976, and 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 68 ft³/s (1.93 m³/s) Mar. 4, gage height, 2.52 ft (0.768 m); maximum gage height, 2.75 ft (0.838 m) Feb. 24, backwater from ice; no peak discharge above base of 80 ft³/s (2.27 m³/s); no flow on many days during year.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.01	.40	.01	.00	.00	7.0	3.1	.34	.01	2.5	.18	.00
2	.01	.15	.00	.00	.00	4.1	10	.28	.33	.95	.66	.29
3	.01	.03	.00	.00	.00	2.4	15	.20	.06	.75	1.6	.75
4	.01	.00	.00	.00	.00	26	13	.14	.00	.75	.75	.24
5	2.3	.00	.00	.00	.00	33	39	.10	.52	1.1	1.8	.07
6	39	.00	.00	.00	.00	13	13	.00	3.3	.75	1.8	.03
7	7.4	.00	.00	.00	.00	7.9	5.9	.06	.36	.40	.95	.01
8	.70	.00	.00	.00	.00	12	3.5	.04	.14	.03	.57	.00
9	.20	.00	.00	.00	.00	17	2.1	.03	.12	4.2	.52	.00
10	.04	.00	.00	.00	.01	10	1.6	.02	.00	.01	1.6	.00
11	.01	.00	.00	.00	.02	3.9	1.1	.02	.00	.52	.08	.00
12	.01	.00	.00	.00	.03	4.2	.81	.01	.24	.30	.75	.00
13	.01	.00	.00	.00	.03	4.6	.50	.01	.20	.14	.48	1.2
14	.01	.00	.00	.00	.04	2.2	.44	.01	.06	.05	.12	1.6
15	.01	.00	.00	.00	.06	1.1	.40	.01	.00	.02	.09	.00
16	.01	.00	.00	.00	.00	.80	.38	.02	.00	.01	.04	1.2
17	.01	.00	.00	.00	.11	.75	.38	.02	.00	.00	.01	.95
18	.01	.00	.00	.00	.15	.79	.38	.01	1.9	.00	.00	2.6
19	.05	.00	.00	.00	.15	2.9	.33	.01	.18	1.4	.00	1.4
20	.03	.00	.07	.00	.13	3.8	.33	.01	.02	.03	.00	1.4
21	.02	.00	.00	.00	.11	2.4	.00	.01	.00	.18	.44	.00
22	.01	.00	.00	.00	.15	4.3	1.0	.03	.00	.03	1.0	.38
23	.01	.00	.00	.00	.00	3.6	7.5	.04	.00	.00	.57	.24
24	.05	.00	.00	.00	32	3.2	1.7	.18	.28	.00	.38	1.2
25	.03	.00	.00	.00	33	1.3	19	.12	.33	.00	.24	1.9
26	.02	.50	.00	.00	18	.68	7.5	.14	.00	.00	.00	4.3
27	.01	5.0	.00	.00	13	.75	2.2	.03	.00	.00	.03	1.6
28	.01	1.5	.00	.00	10	16	1.5	.00	2.6	.00	.01	.00
29	.01	.25	.00	.00	---	42	.62	.00	.00	.00	.01	.00
30	.00	.05	.00	.00	---	13	.07	.00	1.6	.00	.00	.00
31	.01	---	.00	.00	---	4.4	---	.02	---	.00	.00	---
TOTAL	52.51	8.00	.07	.00	197.07	251.07	167.57	2.53	32.07	18.32	14.09	25.79
MEAN	1.69	.39	.002	.000	3.84	8.10	5.52	.082	1.07	.59	.45	.86
MAX	39	5.0	.50	.00	33	42	39	.42	19	4.2	1.8	4.3
MIN	.01	.00	.00	.00	.00	.68	.33	.00	.00	.00	.00	.00
CFSM	.27	.05	.0003	.0000	.61	1.29	.76	.01	.17	.09	.08	.14
IN.	.31	.05	.00	.00	.66	1.49	.97	.01	.19	.11	.08	.15

CAL YR 1976 TOTAL 2367.41 MEAN 6.47 MAX 168 MIN .00 CFSM 1.03 IN 14.00
WTR YR 1977 TOTAL 944.77 MEAN 1.81 MAX 42 MIN .00 CFSM .29 IN 5.01

STREAMS TRIBUTARY TO LAKE HURON

04148300 SWARTZ CREEK AT FLINT, MI

LOCATION.--Lat 42°59'16", long 83°43'57", in NW¼ sec.26, T.7 N., R.6 E., Genesee County, Hydrologic Unit 04080204, on right bank 6 ft (2 m) downstream from bridge on South Belenger Highway, in Flint, 3.6 mi (5.8 km) upstream from mouth.

DRAINAGE AREA.--115 mi² (298 km²).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-75: 1971-73.

GAGE.--Water-stage recorder. Datum of gage is 727.05 ft (221.605 m) above mean sea level. Prior to Sept. 4, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year. U.S. Geological Survey gage-height telemark at station.

AVERAGE DISCHARGE.--7 years, 90.7 ft³/s (2569 m³/s), 10.71 in/yr (272 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,160 ft³/s (89.5 m³/s) Apr. 19, 1975, gage height, 9.02 ft (2.749 m); minimum, 0.17 ft³/s (0.005 m³/s) Sept. 7, 10, 11 12, 1977; minimum gage height, 1.16 ft (0.354 m) Aug. 19, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 353 ft³/s (10.0 m³/s) Apr. 4, 5, gage height, 4.77 ft (1.454 m), no peak above base of 800 ft³/s (22.7 m³/s); minimum, 0.17 ft³/s (0.005 m³/s) Sept. 7, 10, 11, 12; minimum gage height, 1.92 ft (0.585 m) July 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.5	13	11	8.5	7.5	44	97	78	8.0	15	2.0	4.9
2	6.4	12	11	8.5	7.5	42	113	72	6.5	8.4	5.1	4.5
3	6.3	11	11	8.0	7.5	46	156	65	5.5	6.4	15	1.6
4	6.7	11	11	7.5	7.5	108	171	60	5.1	6.0	8.0	.77
5	12	11	11	7.0	8.0	186	299	57	4.7	6.7	13	.47
6	57	11	11	7.0	8.0	122	192	53	24	4.4	6.5	.32
7	29	11	11	7.0	8.0	94	152	48	11	3.6	8.0	.26
8	15	11	11	7.0	8.0	96	129	44	9.6	6.2	4.2	.47
9	12	11	11	7.0	8.0	126	114	40	7.0	8.0	5.1	.39
10	12	11	13	7.0	8.0	135	105	38	5.9	3.7	9.5	.21
11	13	10	11	7.0	8.0	112	99	35	6.0	2.7	4.1	.26
12	12	10	9.7	7.0	7.5	110	87	33	11	2.5	2.8	.32
13	12	10	9.7	7.0	7.5	120	78	30	7.8	2.8	1.9	14
14	12	9.6	9.8	7.5	6.5	101	70	28	6.6	1.4	2.2	3.6
15	12	9.6	9.8	7.5	9.8	90	63	25	5.6	1.6	.89	4.3
16	11	9.4	9.5	8.0	10	78	59	22	5.4	1.6	.82	5.8
17	11	9.3	9.3	8.0	10	68	55	20	5.1	1.8	.77	2.1
18	10	9.2	8.9	8.0	11	69	51	19	43	11	.77	18
19	12	9.1	9.0	8.0	11	72	47	18	11	6.8	.32	9.0
20	12	9.2	12	7.5	11	76	44	14	8.1	4.2	.39	6.8
21	12	9.2	9.8	7.5	11	74	42	12	7.5	2.8	1.2	2.1
22	11	8.5	9.5	7.8	12	79	94	15	7.5	1.8	2.1	1.7
23	10	8.5	9.8	7.8	14	76	96	11	7.7	1.2	.86	4.8
24	9.8	8.4	9.8	7.8	99	84	98	9.4	6.8	1.8	1.8	12
25	9.8	9.2	9.8	7.5	75	97	192	8.9	6.1	2.8	.86	6.2
26	10	14	9.8	7.5	68	96	217	7.6	5.3	14	.47	62
27	10	28	9.8	7.5	58	83	156	6.9	6.6	1.8	.96	8.8
28	9.8	15	9.8	7.5	67	99	118	6.5	14	.86	.99	3.8
29	9.7	11	9.8	7.5	---	273	97	5.8	43	4.2	2.7	3.8
30	9.8	11	9.8	7.5	---	161	87	6.8	19	6.8	.77	14
31	10	---	9.8	7.5	---	118	---	9.3	---	3.4	.68	---
TOTAL	483.8	331.8	319.2	231.0	530.5	3003	3329	992.8	329.2	191.66	103.50	142.87
MEAN	15.6	11.1	10.3	7.45	18.9	96.9	111	28.9	10.7	6.57	3.34	4.76
MAX	57	28	13	8.5	99	273	299	78	43	15	15	62
MIN	9.3	9.2	9.5	7.0	7.5	42	42	6.8	6.4	.86	.32	.21
CFSM	.01	.10	.09	.07	.16	.84	.97	.25	.09	.06	.03	.04
IN.	.13	.10	.10	.07	.17	.97	1.08	.29	.10	.05	.03	.05

CAL YR 1976 TOTAL 20660.40 MEAN 56.6 MAX 1040 MIN 1.2 CFSM .87 IN 11.83
WTR YR 1977 TOTAL 9707.10 MEAN 26.7 MAX 299 MIN .21 CFSM .23 IN 3.15

04148440 THREAD CREEK NEAR FLINT, MI

LOCATION.--Lat 42°58'30", long 83°38'09", in SE¼ SE¼ sec.28, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on left bank 20 ft (6 m) downstream from bridge on Bristol Road, 6.0 mi (9.7 km) upstream from mouth, and 4.0 mi (6.4 km) southeast of Flint.

DRAINAGE AREA.--55.6 mi² (144.0 km²).

PERIOD OF RECORD.--January 1970 to current year.

GAGE.--Water-stage recorder. Datum of gage is 764.36 ft (232.977 m) above mean sea level. Prior to May 13, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.--7 years, 41.8 ft³/s (1.184 m³/s), 10.21 in/yr (259 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,260 ft³/s (35.7 m³/s) Apr. 19, 1975, gage height, 7.65 ft (2.332 m) from high water marks; no flow Aug. 7, 8, 10, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 180 ft³/s (5.10 m³/s) Apr. 5, gage height, 4.48 ft (1.366 m); maximum gage height, 4.58 ft (1.396 m) Mar. 5, backwater from ice; no peak discharge above base of 300 ft³/s (8.50 m³/s); minimum, 0.30 ft³/s (0.008 m³/s) July 28, gage height, 0.62 ft (0.189 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.6	13	10	7.5	6.5	25	91	37	5.8	18	1.9	11
2	8.8	15	10	7.0	6.5	23	93	33	6.0	5.3	1.4	8.4
3	8.1	15	10	7.0	6.5	25	119	28	6.4	5.1	6.4	4.2
4	7.6	15	10	6.5	6.5	35	102	26	5.1	5.3	8.6	3.0
5	7.9	14	10	6.0	6.5	100	194	23	4.9	5.6	7.1	3.0
6	56	13	10	6.0	7.0	80	117	22	12	4.2	4.0	2.9
7	28	13	10	6.0	7.0	68	97	20	6.6	3.4	17	2.6
8	21	12	10	6.0	7.0	65	79	18	7.6	3.5	4.6	2.4
9	21	12	10	6.0	7.0	75	65	16	7.5	9.7	3.2	2.5
10	18	12	10	6.0	7.0	80	55	14	6.3	4.0	9.6	2.2
11	15	12	10	6.0	6.5	80	46	13	6.3	2.8	3.8	1.9
12	13	12	9.5	6.0	6.5	80	40	13	7.2	2.5	4.2	2.0
13	11	11	9.8	6.0	6.5	83	35	12	6.6	2.5	3.3	11
14	10	11	8.5	6.5	7.0	83	32	11	6.1	2.3	3.2	11
15	9.8	11	8.5	6.5	7.5	84	30	10	5.7	2.2	2.6	9.6
16	9.0	13	8.5	6.5	8.0	72	28	9.1	5.1	1.7	2.3	9.5
17	8.5	11	8.5	7.0	8.5	60	27	7.5	4.3	1.3	2.3	8.4
18	8.5	11	8.5	7.0	9.0	54	26	7.9	11	7.7	1.8	19
19	9.4	11	8.5	7.0	9.0	49	24	7.6	6.5	6.6	1.9	13
20	10	11	8.5	6.5	9.0	46	23	7.1	7.0	2.3	2.1	8.7
21	9.9	11	8.5	6.0	9.0	44	21	6.4	6.7	1.8	2.3	6.9
22	11	11	8.5	6.0	10	40	20	6.4	6.6	1.1	4.3	6.7
23	11	11	8.0	6.0	11	47	49	7.0	5.0	.78	2.4	8.4
24	11	11	8.0	6.0	10	43	49	6.7	4.7	1.1	2.6	7.8
25	11	11	8.0	6.5	55	42	89	6.3	4.1	1.9	2.1	8.2
26	11	13	8.0	6.5	40	38	88	5.5	3.6	1.6	1.6	30
27	10	26	8.0	6.5	30	36	88	6.0	3.5	.91	1.6	13
28	10	20	8.0	6.5	27	60	75	6.3	2.9	.98	1.4	9.9
29	10	11	8.0	6.5	---	130	58	6.8	18	1.7	2.2	9.9
30	11	10	8.0	6.5	---	116	46	5.9	9.9	4.5	2.3	8.6
31	10	---	8.0	6.5	---	114	---	5.8	---	2.1	1.8	---
TOTAL	414.1	382	277.0	198.5	342.0	1967	1862	393.1	198.3	105.44	111.6	244.7
MEAN	13.4	12.8	8.94	6.40	12.2	63.5	62.1	12.7	6.61	3.40	3.60	8.22
MAX	56	26	10	7.5	55	130	194	37	18	18	17	30
MIN	7.6	10	8.0	6.0	6.5	25	23	5.8	2.9	.98	1.4	1.9
CFSM	.24	.23	.16	.11	.22	1.14	1.12	.23	.12	.06	.07	.15
IN.	.28	.26	.19	.13	.23	1.32	1.25	.26	.13	.07	.07	.17

CAL YR 1976 TOTAL 17295.50 MEAN 47.0 MAX 485 MIN 8.3 CFSM .85 IN 11.91
WTR YR 1977 TOTAL 6495.74 MEAN 17.8 MAX 194 MIN .98 CFSM .32 IN 4.35

04148500 FLINT RIVER NEAR FLINT, MI

LOCATION.--Lat 43°02'20", long 83°46'10", in SW¼ sec.4, T.7 N., R.6 E., Genesee County, on left bank on grounds of sewage treatment plant, 1.2 mi (1.9 km) upstream from Pirnie Creek, 1.8 mi (2.9 km) downstream from Flint, and 5.0 mi (8.0 km) downstream from Swartz Creek.

DRAINAGE AREA.--954 mi² (2,471 km²).

PERIOD OF RECORD.--September 1903 to March 1904 (gage heights only), August 1932 to current year. Gage-height records for flood seasons collected in this vicinity 1911-32, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 954: 1941. WSP 1337: 1933-34(M), 1935-37. WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 678.80 ft (206.898 m) above mean sea level (levels by U.S. Weather Bureau and city of Flint).

REMARKS.--Records good except those for period of no gage-height record, Mar. 3 to Apr. 3, which are fair. Some regulation by reservoirs above station (see sta 04147000). Occasional diversion for industrial use. Since Dec. 17, 1967, flow contains up to 50 ft³/s (1.42 m³/s) as sewage effluent which originates outside the basin. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--45 years, 574 ft³/s (16.26 m³/s), 8.17 in/yr (208 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,900 ft³/s (422 m³/s) Apr. 6, 1947, gage height, 16.35 ft (4.983 m); minimum, 9.0 ft³/s (0.25 m³/s) Aug. 7, 1934.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,450 ft³/s (69.4 m³/s) Apr. 5, gage height, 7.56 ft (2.304 m); minimum, 85 ft³/s (2.41 m³/s) May 29; minimum gage height, 2.60 ft (0.820 m) Oct. 3, 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	129	300	309	166	186	795	1280	572	151	211	113	149
2	129	343	361	176	188	737	1460	525	128	162	110	173
3	116	328	339	162	191	680	1480	376	109	131	100	139
4	114	325	328	187	162	758	1440	163	105	138	133	119
5	120	319	313	183	193	1560	2070	153	114	148	169	115
6	378	289	298	182	191	1000	1730	173	240	132	136	116
7	540	307	293	189	189	1000	1560	382	148	127	122	121
8	385	313	285	213	162	1160	1420	291	127	194	182	132
9	304	263	276	216	162	1300	1200	280	126	215	117	148
10	211	274	264	204	190	1080	1160	285	119	121	180	168
11	180	370	262	196	212	1000	1070	190	117	110	101	174
12	200	454	252	194	243	1700	994	162	130	134	114	175
13	241	338	242	184	229	1460	969	171	132	117	105	286
14	262	373	237	189	334	1900	1000	164	128	116	113	327
15	260	389	234	181	314	1400	1060	164	119	109	105	318
16	284	362	231	181	287	1400	988	127	108	106	107	291
17	261	345	231	180	298	1300	954	129	102	104	108	261
18	257	327	227	178	283	1300	934	139	994	845	103	414
19	258	294	224	178	283	1200	959	126	156	199	106	374
20	271	164	230	182	274	1100	864	123	140	144	112	329
21	284	182	234	182	298	1050	810	119	138	134	103	241
22	280	168	237	182	298	1000	971	118	134	144	108	216
23	257	178	250	181	281	958	960	107	130	131	107	203
24	262	194	260	179	262	980	883	119	102	123	130	257
25	263	204	256	184	264	858	964	110	240	187	108	324
26	262	227	229	194	265	860	1110	107	119	102	104	302
27	260	213	222	190	270	820	980	109	110	115	104	253
28	284	249	235	198	278	1400	969	109	104	113	119	245
29	284	208	198	193	----	1400	875	98	095	134	143	256
30	266	224	162	174	----	1700	887	98	230	136	137	263
31	274	----	194	181	----	1360	----	100	----	134	132	----
TOTAL	7997	9054	7858	5850	6983	36270	32050	9060	5017	4486	3823	6057
MEAN	258	302	253	189	241	1170	1068	302	167	145	127	202
MAX	540	454	361	216	334	1700	2070	572	240	215	180	414
MIN	110	164	194	174	186	680	810	98	095	104	100	116
AC-FT	15860	17960	15590	11600	13850	71940	63570	17970	9950	8900	7580	12010
CFSM	0.27	0.32	0.27	0.20	0.25	1.23	1.12	0.32	0.18	0.15	0.13	0.21
IN.	0.31	0.35	0.30	0.23	0.27	1.40	1.25	0.35	0.20	0.17	0.15	0.24

CAL YR 1976 TOTAL 256044 MEAN 701 MAX 3060 MIN 110 AC-FT 507900 CFSM 0.74 IN. 10.00
WTR YR 1977 TOTAL 136806 MEAN 374 MAX 2070 MIN 95 AC-FT 271400 CFSM 0.39 IN. 5.34

adjusted for change in contents in Holloway Reservoir.

04198720 CREEK NEAR BLUE MOUNTAIN, OH

LOCATION.--Lat 43°10'12", long 83°05'05", in SE¼ NE¼ sec.23, T.3 S., R.5 E., Geneva Quadr., Ashtabula and CUYAHOGA, on right bank 10 ft (3 m) downstream from bridge on Merrick Road, 0.8 mi (1.3 km) upstream from Central-Chamber Creek, 3.0 mi (4.8 km) upstream from mouth, and 3.1 mi (5.0 km) east of Westerose.

DRAINAGE AREA.--16.3 mi² (17.4 km²).

PERIOD OF RECORD.--January 1970 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 635 ft (200 m) from topographic map (Geneva 1:24). Prior to Aug. 31, 1970, non-recording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--7 years, 16.3 ft³/s (0.462 m³/s), 11.51 in/yr (287 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 730 ft³/s (20.7 m³/s) Dec. 31, 1971, gage height, 6.26 ft (1.991 m); maximum gage height, 7.09 ft (2.158 m) Mar. 15, 1971, backwater from ice; minimum discharge, 2.3 ft³/s (0.065 m³/s) Sept. 7, 1972; minimum gage height, 1.61 ft (0.508 m) Aug. 9, 17, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 188 ft³/s (5.32 m³/s) June 30, gage height, 5.31 ft (1.619 m); maximum gage height, 5.69 ft (1.734 m) Feb. 25, backwater from ice; no peak discharge above base of 250 ft³/s (7.08 m³/s); maximum, 5.9 ft³/s (0.062 m³/s) May 29, 31, Aug. 2, 3, Sept. 11, 12, 13; minimum gage height, 3.14 ft (0.957 m) June 6, 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEARS OCTOBER 1974 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.9	11	9.8	9.8	9.8	9.8	12	7.9	9.8	28	8.8	7.0
2	9.8	9.6	9.8	9.8	9.8	9.8	9.8	9.8	9.8	13	9.8	10
3	9.8	9.6	9.8	9.8	9.8	9.8	17	9.8	9.9	9.8	9.8	9.8
4	9.8	9.6	9.8	9.8	9.8	17	13	9.9	9.9	7.8	10	9.8
5	9.8	9.9	9.8	9.8	9.8	16	10	9.8	11	7.8	7.8	9.8
6	16	9.8	9.8	9.8	15	46	9.8	9.8	10	8.8	10	9.8
7	11	9.8	9.8	9.8	12	13	9.1	48	8.8	8.8	8.8	9.8
8	11	9.1	9.8	9.8	10	11	9.8	7.1	8.8	8.8	9.8	9.8
9	9.6	9.9	9.8	9.8	9.8	9.8	9.8	9.8	9.8	13	9.8	9.8
10	9.9	9.8	9.8	9.8	9.8	17	7.8	9.8	9.8	11	10	9.8
11	9.2	9.8	9.8	9.8	9.8	20	7.8	9.7	9.8	9.8	11	9.1
12	9.7	9.8	9.8	9.8	9.8	12	8.7	9.9	9.8	9.8	9.8	9.8
13	9.9	9.8	9.8	9.8	7.8	10	7.1	9.8	9.8	9.8	9.8	9.8
14	9.7	9.1	9.8	9.8	9.8	10	7.1	9.8	9.8	9.8	17	9.1
15	7.9	9.9	9.8	9.8	11	9.8	8.7	9.8	9.1	9.8	10	9.9
16	7.9	9.9	9.8	9.8	12	7.8	9.9	9.8	9.1	9.8	9.8	9.8
17	8.9	9.8	9.8	9.8	12	9.8	9.8	9.8	9.8	7.1	9.8	10
18	9.1	9.8	9.8	9.8	12	9.8	9.8	9.8	10	9.8	9.8	9.8
19	9.9	9.8	9.8	9.8	12	9.1	9.8	9.8	9.8	9.8	9.8	9.8
20	10	9.8	9.8	9.8	10	10	9.8	9.9	9.9	7.8	9.8	9.8
21	11	9.1	9.1	9.8	12	10	9.8	9.8	9.8	9.8	9.8	9.1
22	9.7	9.9	9.8	9.8	12	11	7.8	9.8	9.8	9.8	9.8	9.1
23	9.1	9.8	9.8	9.8	13	11	8.8	9.8	9.8	9.8	9.8	9.1
24	9.1	9.8	9.8	9.8	14	9.8	10	9.8	9.8	9.8	9.1	9.8
25	9.8	9.9	9.8	9.8	9.8	7.1	10	9.8	9.8	9.8	9.8	9.8
26	7.9	9.9	9.8	9.8	9.8	9.9	10	9.8	9.8	9.8	9.8	9.8
27	8.8	12	9.8	9.8	9.8	9.9	10	9.8	9.8	9.8	9.8	9.8
28	7.8	12	9.8	9.8	9.8	9.9	10	9.8	9.8	9.8	9.8	9.8
29	7.8	9.8	9.8	9.8	---	8.8	9.8	9.8	9.8	9.8	9.8	9.8
30	7.9	9.8	9.8	9.8	---	9.1	7.8	9.8	9.8	9.8	9.8	9.8
31	8.8	---	9.8	9.8	---	12	---	9.8	---	9.8	9.8	---
TOTAL	279.3	286.8	293.8	303.8	309.8	453.2	305.7	291.1	303.8	297.8	306.8	293.1
MEAN	9.01	9.56	9.48	9.80	11.1	14.6	10.2	9.39	10.1	9.61	9.90	9.77
MAX	16	17	9.8	9.8	15	46	17	48	30	28	17	10
MIN	6.6	6.8	9.8	9.8	9.8	8.8	6.8	7.8	8.8	7.8	8.8	9.8
CFSM	.553	.586	.581	.601	.682	.896	.626	.576	.622	.589	.607	.599
IN.	.638	.655	.672	.694	.708	1.04	.699	.665	.694	.681	.702	.670

CAL YR 1976	TOTAL	5,114.8	MEAN	14.0	MAX	207	MIN	6.7	CFSM	1.056	IN	15.81
WTR YR 1977	TOTAL	3,715.8	MEAN	9.63	MAX	91	MIN	6.8	CFSM	.597	IN	9.208

04149000 FLINT RIVER NEAR FOSTERS, MI

LOCATION.--Lat 43°18'30", long 83°57'13", in SE¼ SE¼ sec.35, T.11 N., R.4 E., Saginaw County, Hydrologic Unit 04080204, on left bank 20 ft (6 m) downstream from bridge on State Highway 13, 2 mi (3 km) west of Fosters and 6.5 mi (10.5 km) downstream from Silver Creek. Records include flow of Birch Run.

DRAINAGE AREA.--1,189 mi² (3,080 km²), includes that of Birch Run above State Highway 13.

PERIOD OF RECORD.--October 1939 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1910-20, 1922-27 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 954: 1941. WSP 1337: 1940, 1942, 1943-44(M), 1945, 1946-47(M), 1948-50. WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 600 ft (183 m) from topographic map. Prior to Oct. 1, 1969, nonrecording gage at site 2.2 mi (3.5 km) upstream at datum 582.22 ft (177.461 m) above mean sea level.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation by reservoirs above Flint. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--38 years, 728 ft³/s (20.62 m³/s), 8.31 in/yr (211 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 19,000 ft³/s (538 m³/s) Apr. 7, 1947 (including flow bypassing gage); maximum gage height, 18.6 ft (5.67 m) Feb. 2, 1968, site and datum then in use; minimum discharge observed, 27 ft³/s (0.76 m³/s) Aug. 6, 1941.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of March 1904, reached a stage of 18.4 ft (5.61 m) from U.S. Weather Bureau data, site and datum then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,750 ft³/s (77.9 m³/s) Apr. 5, gage height, 9.96 ft (3.036 m); minimum, 103 ft³/s (2.92 m³/s) May 31, gage height, 1.83 ft (0.558).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	238	427	370	190	210	900	1450	701	138	304	158	168
2	138	347	390	200	220	850	1390	628	186	252	156	186
3	126	340	370	210	220	773	1590	587	154	191	150	213
4	124	342	350	220	220	854	1500	396	138	164	227	177
5	119	345	340	220	220	1520	2250	258	138	158	191	158
6	153	338	330	220	220	1360	2390	247	162	164	214	143
7	628	333	310	220	220	1120	1870	269	307	159	193	142
8	427	331	300	230	220	1120	1720	363	195	153	169	142
9	309	398	300	250	220	1260	1450	363	166	182	162	146
10	265	283	290	250	220	1630	1380	338	159	225	175	159
11	191	377	280	240	220	1850	1310	267	150	162	241	177
12	200	475	270	230	250	1820	1210	227	153	146	189	184
13	227	405	260	220	300	1920	1140	223	168	150	159	189
14	252	368	250	220	380	1780	1150	238	164	150	175	357
15	258	410	250	210	380	1650	1240	223	153	138	214	273
16	249	415	250	210	360	1620	1190	202	150	143	175	258
17	252	415	250	210	350	1520	1120	186	151	171	154	340
18	247	403	250	210	350	1470	1060	187	234	180	154	398
19	254	279	250	210	330	1400	1030	195	423	241	150	693
20	267	223	250	210	320	1270	947	178	218	220	146	652
21	277	216	250	210	320	1180	908	169	180	193	151	403
22	265	223	250	210	320	1160	693	162	173	180	162	286
23	265	236	260	210	320	1120	794	162	166	173	196	262
24	275	247	270	210	380	1030	875	173	162	164	175	267
25	277	262	260	210	450	953	826	158	377	156	171	438
26	283	281	250	210	700	905	1360	148	312	156	171	408
27	281	365	250	200	900	875	1280	142	177	156	162	391
28	300	487	230	170	920	872	1100	134	154	146	158	307
29	311	342	220	190	---	1530	965	135	592	145	159	267
30	322	350	200	200	---	1880	854	119	655	154	169	302
31	398	---	180	210	---	1520	---	110	---	187	182	---
TOTAL	8178	10263	8530	6610	9740	40712	38042	7888	6655	5463	5408	8486
MEAN	264	342	275	213	348	1313	1268	254	222	176	174	283
MAX	628	487	390	250	920	1920	2390	701	655	304	241	693
MIN	119	216	180	170	210	773	693	110	138	138	146	142

CAL YR 1976 TOTAL 447785 MEAN 1223 MAX 9000 MIN 119
WTR YR 1977 TOTAL 155975 MEAN 427 MAX 2390 MIN 110

STREAMS TRIBUTARY TO LAKE HURON

04149500 FLINT RIVER NEAR ALICIA, MI

LOCATION.--Lat 43°18'40", long 84°02'00", in SE¼ sec.31, T.11 N., R.4 E., Saginaw County, Hydrologic Unit 04080204, on left bank 100 ft (30 m) downstream from the Prairie Farms Association flood-pumping station, 2.8 mi (4.5 km) north of Alicia, and 4 mi (6 km) upstream from mouth.

PERIOD OF RECORD.--November 1948 to current year (gage heights only).

GAGE.--Water-stage recorder. Datum of gage is 577.00 ft (175.870 m) above mean sea level.

REMARKS.--Records good. Records represent stages in the Shiawassee Flats area.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 13.70 ft (4.176 m) Apr. 3, 1960; minimum, less than 1.5 ft (0.46 m) during many days in 1949, 1958, 1959, 1963, 1964, 1966-69.

EXTREMES FOR CURRENT YEAR.--Maximum gage height recorded, 5.37 ft (1.637 m) Oct. 6; minimum gage height, 1.56 ft (0.475 m) July 1.

GAGE HEIGHT, IN FEET, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.13	3.82	3.15	2.82	---	3.59	4.29	3.43	2.86	2.38	3.17	3.09
2	4.09	3.12	3.65	---	---	3.54	4.23	3.88	3.49	3.33	3.01	3.38
3	4.38	3.58	3.29	---	---	3.57	4.36	3.92	3.15	2.93	3.20	3.49
4	4.04	3.65	3.16	---	---	3.71	4.58	3.69	2.94	3.10	2.99	2.93
5	3.81	3.58	3.18	---	---	4.57	4.49	3.26	3.39	3.13	2.91	3.32
6	4.91	3.12	3.12	---	---	5.12	5.11	3.35	4.04	3.01	3.30	3.31
7	4.84	3.84	3.42	---	---	4.94	4.93	3.89	3.70	3.41	3.07	3.21
8	4.43	3.79	3.18	---	---	4.77	5.01	3.72	3.41	3.37	3.01	3.38
9	4.67	3.18	3.39	---	---	4.69	4.47	4.14	3.65	3.61	3.42	2.37
10	4.28	3.61	2.71	---	---	4.77	4.02	3.38	3.28	3.51	3.15	3.05
11	3.84	3.52	3.19	---	---	4.93	3.70	3.29	3.03	3.23	2.99	3.25
12	3.56	3.53	3.12	---	---	4.99	3.69	3.10	3.69	2.87	3.01	2.64
13	3.94	3.15	3.33	---	---	4.99	3.70	3.54	3.62	3.22	2.90	3.06
14	4.17	3.15	2.33	---	---	4.87	3.93	3.44	3.33	3.23	3.28	3.27
15	3.42	3.32	3.26	---	---	4.65	3.81	3.23	3.24	3.11	3.30	3.16
16	4.17	3.20	3.05	---	---	4.34	3.66	3.05	2.93	3.28	3.09	2.99
17	4.23	2.77	3.06	---	2.77	4.33	3.60	3.02	3.01	3.01	3.02	2.91
18	4.08	3.17	3.24	---	2.72	4.78	3.57	3.21	2.89	3.06	3.43	3.28
19	3.92	3.30	2.93	---	2.74	4.24	3.68	3.26	3.08	3.07	3.12	3.65
20	3.93	3.54	3.22	---	2.74	3.82	3.49	3.18	3.20	2.98	3.25	3.67
21	3.45	3.48	3.18	---	2.60	3.62	3.42	3.08	3.28	3.40	2.87	4.16
22	3.32	2.95	2.61	---	2.56	4.28	3.73	2.95	3.35	3.57	3.05	4.00
23	3.88	3.08	2.91	---	2.82	3.66	4.19	2.99	3.12	2.97	3.16	3.80
24	4.23	3.13	2.90	---	2.81	3.82	3.79	3.19	2.96	3.10	3.15	3.65
25	4.22	3.29	2.91	---	3.50	3.58	4.02	3.51	3.28	3.40	3.31	3.17
26	4.49	3.16	2.97	---	4.09	3.33	4.10	3.43	3.20	3.47	2.85	3.27
27	4.07	3.66	2.97	---	3.95	3.12	3.96	3.17	2.97	3.31	2.69	3.31
28	3.03	3.14	2.92	---	3.67	3.30	4.66	3.20	2.86	2.91	2.59	3.50
29	3.38	3.02	2.89	---	---	3.49	3.96	3.88	2.97	2.82	3.17	3.25
30	3.65	2.71	2.82	---	---	4.32	3.65	3.42	3.19	3.28	3.34	3.34
31	4.46	---	2.75	---	---	4.33	---	3.28	---	2.71	2.85	---
MEAN	4.03	3.32	3.06	---	---	4.20	4.06	3.39	3.24	3.15	3.09	3.30
MAX	4.91	3.84	3.65	---	---	5.12	5.11	4.14	4.04	3.61	3.43	4.16
MIN	3.03	2.71	2.33	---	---	3.12	3.42	2.95	2.86	2.38	2.59	2.37

04150000 SOUTH BRANCH CASS RIVER NEAR CASS CITY, MI

LOCATION.--Lat 43°34'01", long 83°06'43", in SW¼ NW¼ sec.7, T.13 N., R.12 E., Sanilac County, Hydrologic Unit 04080205, on left bank 1.5 mi (2.4 km) downstream from bridge on State Highway 53, 3.9 mi (6.3 km) southeast of Cass City, 4.2 mi (6.8 km) upstream from confluence with North Branch.

DRAINAGE AREA.--251 mi² (650 km²).

PERIOD OF RECORD.--October 1948 to current year. Monthly discharge only for some periods, published in WSP 1307. Prior to October 1963, published as East Branch Cass River near Cass City.

REVISED RECORDS.--WSP 1337: 1949-50. WSP 1707: 1951-53, 1959.

GAGE.--Water-stage recorder. Datum of gage is 719.5 ft (219.3 m) above mean sea level. Prior to Nov. 8, 1952, nonrecording gage at site 1.5 mi (2.4 km) upstream at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 124 ft³/s (3.512 m³/s), 6.71 in/yr (170 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,400 ft³/s (181 m³/s) Mar. 28, 1967, gage height, 14.86 ft (4.529 m); minimum, 0.2 ft³/s (0.006 m³/s) Sept. 20-23, 1955, Aug. 19, 20, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,080 ft³/s (30.6 m³/s) Mar. 10, gage height, 8.16 ft (2.487 m), no peak above base of 1,100 ft³/s (31.2 m³/s); minimum, 2.9 ft³/s (0.082 m³/s) Aug. 2, gage height, 1.73 ft (0.527 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.3	11	7.6	6.3	5.8	200	196	24	9.6	6.3	3.1	5.4
2	6.3	13	7.3	6.4	5.8	165	159	24	17	8.8	3.1	6.5
3	6.1	12	7.4	6.5	5.8	150	216	22	34	7.4	4.1	8.0
4	5.9	11	7.2	6.6	5.8	165	169	21	23	6.1	4.2	16
5	5.8	10	7.3	6.5	5.8	600	513	22	17	5.9	6.2	17
6	14	9.5	7.4	6.4	5.8	720	454	22	14	5.3	7.8	13
7	30	9.2	7.4	6.4	5.8	580	242	20	17	5.2	9.9	9.6
8	38	8.5	7.4	6.4	6.0	500	167	18	25	5.5	11	9.0
9	26	8.7	7.4	6.4	6.4	700	134	16	21	6.3	11	9.6
10	17	9.2	7.4	6.3	7.0	900	112	17	16	39	13	8.1
11	13	8.8	7.4	6.2	10	740	101	15	13	82	16	6.4
12	11	8.5	7.4	6.2	17	658	86	15	12	32	14	5.6
13	9.8	8.5	7.4	6.2	25	838	73	15	10	15	13	5.4
14	9.0	8.0	7.4	6.2	30	722	66	15	9.1	9.0	13	5.4
15	8.4	8.0	7.4	6.2	28	389	57	14	8.5	6.6	11	5.0
16	7.9	8.0	7.4	6.2	22	280	52	13	7.3	5.0	12	9.2
17	7.9	8.0	7.4	6.1	20	201	48	12	6.8	4.1	26	12
18	7.5	8.4	7.4	6.0	23	149	49	13	8.1	3.7	28	24
19	7.6	8.6	7.4	5.9	22	115	51	13	10	5.4	18	79
20	8.3	8.8	7.4	5.8	21	121	50	13	12	5.7	12	615
21	8.6	8.8	7.4	5.8	23	122	50	12	12	5.3	8.9	464
22	9.3	7.9	7.4	5.8	26	132	47	11	8.7	5.0	8.0	219
23	9.2	8.0	7.4	5.8	31	140	45	11	7.2	4.3	7.0	129
24	9.2	7.8	7.3	5.7	74	106	43	12	6.5	4.0	7.0	84
25	9.2	7.7	7.2	5.7	270	108	41	11	6.1	3.7	6.4	80
26	9.2	9.2	7.1	5.7	260	86	39	9.9	5.6	3.6	6.1	99
27	9.2	13	7.0	6.0	255	84	36	8.5	5.1	3.4	5.7	126
28	8.9	16	7.0	6.2	225	134	33	7.5	4.8	3.2	5.4	116
29	8.7	13	6.8	6.0	---	524	29	6.9	4.8	3.2	5.4	81
30	9.3	9.6	6.6	5.8	---	491	27	6.3	5.0	3.1	5.1	52
31	10	---	6.0	5.8	---	270	---	6.8	---	3.2	5.0	---
TOTAL	346.6	286.7	225.0	189.5	1442.0	11090	3385	446.9	356.2	306.3	306.4	2319.2
MEAN	11.2	9.56	7.26	6.11	51.5	358	113	14.4	11.9	9.88	9.88	77.3
MAX	38	16	7.6	6.6	270	900	513	24	34	82	28	615
MIN	5.9	7.7	6.0	5.7	5.8	84	27	6.3	4.8	3.1	3.1	5.0
CFSM	.05	.04	.03	.02	.21	1.43	.45	.06	.05	.04	.04	.31
IN.	.05	.04	.03	.03	.21	1.64	.50	.07	.05	.05	.05	.34

CAL YR 1976	TOTAL	89246.2	MEAN	244	MAX	5560	MIN 4.9	CFSM .97	IN 13.23
WTR YR 1977	TOTAL	20699.8	MEAN	56.7	MAX	900	MIN 3.1	CFSM .23	IN 3.07

04150500 CASS RIVER AT CASS CITY, MI

LOCATION.--Lat 43°35'03", long 83°10'34", in NE¼ NE¼ sec.4, T.13 N., R.11 E., Tuscola County, Hydrologic Unit 04080205, on left bank 600 ft (183 m) downstream from bridge on Cemetary Road, 0.3 mi (0.5 km) downstream from confluence of North and South Branches, and 1.1 mi (1.8 km) south of Cass City.

DRAINAGE AREA.--370 mi² (960 km²), approximately.

PERIOD OF RECORD.--October 1947 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1337: 1949-50. WSP 1727: 1948(M), 1950.

GAGE.--Water-stage recorder. Datum of gage is 697.92 ft (212.726 m) above mean sea level. Prior to Nov. 14, 1952, nonrecording gage at site 600 ft (183 m) upstream at present datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 199 ft³/s (5.636 m³/s), 7.30 in/yr (185 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,460 ft³/s (240 m³/s) Mar. 20, 1948, gage height, 15.80 ft (4.816 m), from graph based on gage readings; minimum, 0.50 ft³/s (0.014 m³/s) Sept. 26, 1948.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,400 ft³/s (39.6 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 10	--	*1,610	45.6	*a8.85	2.697	Mar. 13	2000	1,410	39.9	8.32	2.536

a Ice jam.

Minimum discharge, 3.8 ft³/s (0.11 m³/s) Aug. 2, gage height, 4.45 ft (1.356 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.3	16	33	8.4	9.2	300	437	67	22	11	4.6	19
2	7.8	15	29	8.6	9.2	270	356	64	31	13	4.5	23
3	7.5	15	25	8.8	9.2	280	437	60	55	12	5.7	29
4	7.4	14	21	9.0	9.2	300	389	58	43	10	6.8	34
5	7.6	13	18	9.0	9.2	900	814	58	33	9.9	13	38
6	16	13	17	9.0	9.2	1150	759	57	33	8.8	18	34
7	26	12	15	9.0	9.2	940	547	55	39	9.2	21	28
8	39	12	13	9.0	9.6	1000	424	50	45	9.7	28	24
9	32	11	12	9.0	10	1300	321	46	42	11	41	23
10	23	11	10	9.0	15	1450	256	45	34	14	47	21
11	18	11	9.8	9.0	25	1300	222	43	28	74	55	18
12	16	10	9.2	9.0	30	1120	195	39	24	42	47	15
13	14	10	9.0	9.0	40	1250	169	37	21	22	36	14
14	13	11	8.8	9.0	45	1150	150	36	19	15	33	14
15	12	12	8.7	9.0	48	776	131	35	17	11	32	14
16	12	15	8.6	9.2	42	603	119	31	15	8.5	38	27
17	12	16	8.6	9.2	37	445	111	28	15	6.6	99	50
18	11	12	8.6	9.4	40	332	108	27	21	5.4	98	75
19	11	13	8.6	9.4	38	250	114	26	25	12	88	158
20	12	14	8.6	9.6	38	230	120	25	23	22	79	713
21	12	15	8.6	9.6	39	220	181	22	21	17	56	697
22	13	22	8.6	9.4	44	225	194	20	17	13	44	419
23	13	19	8.6	9.2	60	225	166	21	14	11	39	306
24	12	17	8.6	9.2	130	195	153	40	13	9.2	34	215
25	12	18	8.6	9.2	400	185	133	47	13	8.1	30	183
26	12	21	8.6	9.2	390	165	115	55	11	6.6	26	182
27	12	31	8.6	9.2	380	161	101	40	9.4	5.9	22	249
28	12	46	8.6	9.2	330	205	88	28	8.7	5.1	19	255
29	11	55	8.6	9.2	---	659	79	22	9.2	4.9	19	225
30	12	40	8.4	9.2	---	699	73	19	8.7	4.7	18	188
31	13	---	8.0	9.2	---	527	---	18	---	4.7	17	---
TOTAL	439.6	540	375.3	282.4	2255.0	18812	7462	1219	710.0	417.3	1118.6	4290
MEAN	14.2	18.0	12.1	9.11	80.5	607	249	39.3	23.7	13.5	36.1	143
MAX	39	55	33	9.6	400	1450	814	67	55	74	99	713
MIN	7.4	10	8.0	8.4	9.2	161	73	18	8.7	4.7	4.5	14
CFSM	.04	.05	.03	.03	.22	1.64	.67	.11	.06	.04	.10	.39
IN.	.04	.05	.04	.03	.23	1.89	.75	.12	.07	.04	.11	.43

CAL YR 1976	TOTAL	124081.0	MEAN 339	MAX 6650	MIN 5.4	CFSM .92	IN 12.48
WTR YR 1977	TOTAL	37921.2	MEAN 104	MAX 1450	MIN 4.5	CFSM .28	IN 3.81

04150800 CASS RIVER AT WAHJAMEGA, MI

LOCATION.--Lat 43°27'02", long 83°26'29", in NW¼ NW¼ sec.20, T.12 N., R.9 E., Tuscola County, Hydrologic Unit 04080205, on right bank 90 ft (27 m) upstream from bridge on Chambers Road, on grounds of Caro Regional Center at Wahjamega, 1.9 mi (3.1 km) downstream from Michigan Sugar Co. dam, and 40 mi (64 km) upstream from mouth.

DRAINAGE AREA.--637 mi² (1,650 km²).

PERIOD OF RECORD.--October 1968 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 650 ft (198 m) from topographic map. Prior to June 19, 1969, nonrecording gage at bridge 90 ft (27 m) downstream at present datum.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation by dam at Michigan Sugar Co., 1.9 mi (3.1 km) above station. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--9 years, 404 ft³/s (11.44 m³/s), 8.61 in/yr (219 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,700 ft³/s (331 m³/s) Mar. 6, 1976, gage height, 19.92 ft (6.072 m); minimum, 22 ft³/s (0.62 m³/s) Sept. 22, 1969, and part or all of each day Aug. 9, 10, 16-22, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,710 ft³/s (76.7 m³/s) Mar. 11, gage height, 10.28 ft (3.133 m), only peak above base of 2,400 ft³/s (68.0 m³/s); minimum, 29 ft³/s (0.82 m³/s) July 30, 31, Aug. 1-3; minimum gage height, 2.94 ft (0.896 m) July 30, 31, Aug. 1, 2.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	42	67	60	38	38	320	867	158	53	38	29	53
2	42	71	50	38	38	260	723	152	76	37	29	64
3	40	72	47	37	38	216	887	142	78	37	29	75
4	39	72	42	37	38	297	824	136	92	37	30	74
5	40	70	39	37	38	709	1250	134	88	37	32	82
6	81	67	39	37	38	1120	1550	135	98	36	38	84
7	124	67	40	37	38	1010	1070	125	98	37	42	78
8	126	61	41	38	38	863	821	119	92	42	47	69
9	127	58	42	38	39	1170	650	108	94	48	55	60
10	112	58	42	38	41	2140	526	103	86	59	96	57
11	96	58	43	38	43	2520	450	100	74	65	109	54
12	82	56	42	38	45	1940	396	96	70	112	112	51
13	73	55	43	38	47	1820	347	95	62	92	97	50
14	66	53	42	38	52	2000	307	90	57	61	98	48
15	59	52	40	38	60	1390	274	84	52	50	84	46
16	57	50	40	38	70	1060	253	81	47	45	89	54
17	56	55	40	38	66	815	240	76	46	42	124	97
18	53	56	40	38	52	632	233	74	60	39	162	214
19	53	54	40	38	48	500	235	72	74	39	147	471
20	56	54	40	38	45	449	237	67	68	45	135	1040
21	56	54	40	38	50	439	259	62	64	51	121	1420
22	57	51	40	38	43	442	326	59	57	51	108	876
23	59	45	40	38	40	453	309	60	52	46	90	613
24	61	54	40	38	90	412	280	61	47	41	85	485
25	59	53	40	38	240	362	264	78	45	39	74	471
26	59	62	39	38	360	333	240	82	43	36	65	422
27	56	97	39	38	330	309	218	86	41	33	59	401
28	55	105	39	38	320	351	200	74	39	31	54	423
29	57	84	39	38	---	889	179	59	38	30	61	370
30	58	80	39	38	---	1470	167	50	38	29	59	330
31	68	---	38	38	---	1050	---	47	---	29	52	---
TOTAL	2069	1891	1285	1173	2385	27741	14582	2865	1929	1414	2412	8632
MEAN	66.7	63.0	41.5	37.8	85.2	895	486	92.4	64.3	45.6	77.8	288
MAX	127	105	60	38	360	2520	1550	158	98	112	162	1420
MIN	39	45	38	37	38	216	167	47	38	29	29	46
CFSM	.11	.10	.07	.06	.13	1.41	.76	.15	.10	.07	.12	.45
IN.	.12	.11	.08	.07	.14	1.62	.85	.17	.11	.08	.14	.50

CAL YR 1976 TOTAL 241433 MEAN 660 MAX 11500 MIN 29 CFSM 1.04 IN 14.10
WTR YR 1977 TOTAL 68378 MEAN 187 MAX 2520 MIN 29 CFSM .29 IN 3.99

04151500 CASS RIVER AT FRANKENMUTH, MI

LOCATION.--Lat 43°19'40", long 83°44'53", in NW¼ SE¼ sec.27, T.11 N., R.6 E., Saginaw County, Hydrologic Unit 04080205, on right bank 2,000 ft (610 m) below dam in Frankenmuth, 3,600 ft (1,097 m) above highway bridge on Dehmel Road, 3.4 mi (5.5 km) upstream from Dead Creek, and 17 mi (27 km) upstream from mouth.

DRAINAGE AREA.--848 mi² (2,196 km²).

PERIOD OF RECORD.--February 1908 to March 1909, July 1935 to September 1936, June 1939 to current year.

REVISED RECORDS.--WSP 1307: 1936(M), 1940(M). WSP 1727: 1952. WSP 1911: 1952.

GAGE.--Water-stage recorder. Datum of gage is 583.96 ft (177.991 m) above mean sea level (levels by Michigan Department of Natural Resources). February 1908 to March 1909, nonrecording gage at site 2,000 ft (610 m) upstream at datum 1.81 ft (0.552 m) lower. July 18 to Sept. 11, 1935, nonrecording gage, Sept. 12, 1935, to Sept. 30, 1936, and June 20, 1939, to Sept. 30, 1949, water-stage recorder, at site 3,600 ft (1,097 m) downstream at datum 0.04 ft (0.012 m) higher.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by dams above station. Prior to 1950, regulation at low and medium flows by mill above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--39 years, 477 ft³/s (13.51 m³/s), 7.64 in/yr (194 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 17,700 ft³/s (501 m³/s) Mar. 18, 1942, gage height, 20.88 ft (6.364 m), site and datum then in use; maximum gage height, 23.37 ft (7.123 m) Feb. 3, 1968, backwater from ice; minimum daily discharge, about 1.5 ft³/s (0.042 m³/s) Aug. 6, 1944.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,400 ft³/s (96.3 m³/s) Sept. 19, gage height, 13.72 ft (4.182 m), no peak above base of 3,500 ft³/s (99.1 m³/s); minimum, 35 ft³/s (0.99 m³/s) Aug. 2, gage height, 3.31 ft (1.009 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	68	99	115	73	68	450	1180	206	73	62	41	72
2	65	95	105	72	68	400	1000	198	82	65	39	110
3	63	97	80	72	68	370	1120	187	96	57	46	96
4	59	98	73	71	68	430	1160	176	97	54	44	90
5	57	98	70	70	68	1000	1450	178	104	58	52	106
6	82	95	72	70	68	1400	2010	174	109	55	55	108
7	147	92	76	70	68	1580	1570	164	122	54	53	101
8	155	90	80	70	68	1320	1170	150	113	56	56	95
9	147	88	72	70	69	1440	912	142	108	84	60	85
10	143	91	75	70	70	2100	737	133	106	80	80	78
11	127	88	79	70	72	2880	622	132	98	71	112	72
12	113	85	74	70	76	2490	540	128	91	77	112	68
13	103	85	74	70	94	2120	475	126	87	112	111	68
14	100	81	72	70	105	2230	420	120	82	96	114	71
15	94	79	74	70	110	1890	371	115	76	77	106	72
16	85	76	78	69	110	1390	344	111	71	65	92	102
17	81	77	82	68	105	1090	327	110	64	60	106	118
18	78	81	80	68	100	864	309	116	81	55	134	391
19	79	83	79	68	96	690	303	114	97	52	154	2230
20	83	82	84	68	90	608	307	107	93	52	135	2670
21	83	81	100	68	84	594	313	99	87	54	125	2110
22	83	80	80	68	80	614	370	91	82	59	117	1520
23	83	68	80	67	85	618	402	87	74	57	105	1010
24	84	78	78	67	270	578	370	86	68	55	95	773
25	87	85	77	68	520	497	352	84	64	48	88	896
26	86	91	76	70	560	459	330	93	61	47	84	751
27	86	120	76	68	560	421	294	96	58	46	76	616
28	86	154	76	68	500	447	266	96	56	40	66	573
29	86	105	76	68	---	891	238	86	62	40	73	540
30	84	86	75	68	---	1740	218	74	63	41	72	474
31	93	---	74	68	---	1520	---	70	---	42	69	---
TOTAL	2870	2708	2462	2147	4300	35121	19480	3849	2525	1871	2672	16066
MEAN	92.6	90.3	79.4	69.3	154	1133	649	124	84.2	60.4	86.2	536
MAX	155	154	115	73	560	2880	2010	206	122	112	154	2670
MIN	57	68	70	67	68	370	218	70	56	40	39	68
CFSM	.11	.11	.09	.08	.18	1.34	.77	.15	.10	.07	.10	.63
IN.	.13	.12	.11	.09	.19	1.54	.85	.17	.11	.08	.12	.70

CAL YR 1976 TOTAL 338381 MEAN 925 MAX 13500 MIN 44 CFSM 1.09 IN 14.84
WTR YR 1977 TOTAL 96071 MEAN 263 MAX 2880 MIN 39 CFSM .31 IN 4.21

04152500 TOBACCO RIVER AT BEAVERTON, MI

LOCATION.--Lat 43°52'43", long 84°28'18", in NW¼ SE¼ sec.7, T.17 N., R.1 W., Gladwin County, Hydrologic Unit 04080201, on left bank 15 ft (5 m) downstream from bridge on Glidden Road, 1.0 mi (1.6 km) downstream from dam in Beaverton, and 2.0 mi (3.2 km) upstream from Venison Creek.

DRAINAGE AREA.--487 mi² (1,261 km²).

PERIOD OF RECORD.--July 1948 to current year.

REVISED RECORDS.--WSP 1307: 1948(M).

GAGE.--Water-stage recorder. Datum of gage is 683.27 ft (208.261 m) above mean sea level (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Prior to Feb. 21, 1961, regulation at all stages by hydroelectric powerplant 1.0 mi (1.6 km) above station; occasional regulation since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 380 ft³/s (10.76 m³/s), 10.60 in/yr (269 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,680 ft³/s (217 m³/s) July 9, 1957, gage height, 12.95 ft (3.947 m); minimum, 5.6 ft³/s (0.16 m³/s) July 12, 13, 14, 1959, Aug. 21, 1961; minimum daily, 5.9 ft³/s (0.17 m³/s) July 12, 13, 1959.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,620 ft³/s (45.9 m³/s) Mar. 10, gage height, 6.03 ft (1.838 m); minimum, 99 ft³/s (2.80 m³/s) June 21, gage height, 1.72 ft (0.524 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	220	316	200	240	210	300	470	244	179	147	154	216
2	214	378	215	240	210	200	452	248	191	149	139	270
3	210	326	210	235	215	271	482	212	195	147	138	439
4	208	272	210	235	215	404	483	215	186	148	144	285
5	198	263	210	235	210	674	480	239	175	183	165	236
6	216	263	220	235	210	816	495	260	183	179	180	210
7	258	256	230	230	220	643	441	258	204	187	182	205
8	276	252	250	230	225	583	404	241	201	190	200	201
9	267	251	230	230	230	745	367	221	200	183	180	195
10	255	353	215	225	240	1220	347	210	191	172	183	187
11	249	293	260	225	250	1290	293	206	181	161	191	176
12	246	253	210	220	250	1220	297	199	183	155	184	158
13	209	244	255	220	250	1300	320	177	193	153	173	159
14	247	243	215	220	250	1350	316	164	193	150	168	166
15	252	240	225	220	255	890	305	186	187	143	168	170
16	238	236	229	215	255	700	303	196	178	140	252	173
17	233	246	270	210	255	691	328	203	172	139	319	177
18	232	244	236	210	255	543	344	207	167	140	245	262
19	236	237	229	210	260	455	342	210	161	143	182	344
20	245	244	280	210	260	429	332	205	155	140	185	651
21	254	247	310	210	260	396	341	200	126	137	190	524
22	258	247	320	210	260	420	368	197	118	133	212	252
23	259	243	310	210	270	397	391	204	129	130	210	255
24	260	240	270	210	380	376	362	215	135	129	206	297
25	267	239	255	210	520	295	336	209	136	131	198	423
26	269	243	255	205	470	292	315	197	140	127	148	478
27	262	262	250	205	380	322	292	187	145	123	149	363
28	254	282	250	205	355	357	275	180	145	121	173	354
29	249	200	250	205	---	582	226	172	143	130	248	291
30	247	190	245	210	---	963	228	168	141	138	274	259
31	262	---	240	210	---	663	---	169	---	145	234	---
TOTAL	7550	7803	7554	6785	7620	19787	10735	6399	5033	4593	5974	8376
MEAN	244	260	244	219	272	638	358	206	168	148	193	279
MAX	276	378	320	240	520	1350	495	260	204	190	319	651
MIN	198	190	200	205	210	200	226	164	118	121	138	158
CFSM	.50	.53	.50	.45	.56	1.31	.74	.42	.35	.30	.40	.57
IN.	.58	.60	.58	.52	.58	1.51	.82	.49	.38	.35	.46	.64

CAL YR 1976 TOTAL 203468 MEAN 556 MAX 5400 MIN 44 CFSM 1.14 IN 15.54
WTR YR 1977 TOTAL 98209 MEAN 269 MAX 1350 MIN 118 CFSM .55 IN 7.50

04154000 CHIPPEWA RIVER NEAR MOUNT PLEASANT, MI

LOCATION.--Lat 43°37'32", long 84°42'28", in NW¼ NW¼ sec.8, T.14 N., R.3 W., Isabella County, Hydrologic Unit 04080202, on right bank 12 ft (4 m) downstream from bridge on South Leaton Road, 3.8 mi (6.1 km) northeast of Mount Pleasant, and 36 mi (58 km) upstream from mouth.

DRAINAGE AREA.--416 mi² (1,077 km²).

PERIOD OF RECORD.--October 1930 to September 1931, October 1932 to current year. Monthly discharge only for some periods published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1910-27, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 744: Drainage area. WSP 1337: 1931, 1933-40, 1945, 1948-49.

GAGE.--Water-stage recorder. Datum of gage is 710.38 ft (216.524 m) above mean sea level (levels by Michigan Department of Natural Resources). Prior to Oct. 21, 1938, nonrecording gage at site 30 ft (9 m) upstream at present datum.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation below 750 ft³/s (21.2 m³/s) caused by powerplant at Mount Pleasant prior to 1962, occasional regulation at low flow since. Since July 30, 1968, occasional regulation from control structures on lake outlets. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--46 years, 306 ft³/s (8.666 m³/s), 9.99 in/yr (254 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,960 ft³/s (140 m³/s) Mar. 8, 1946, gage height, 12.78 ft (3.895 m); minimum, 12 ft³/s (0.34 m³/s) Aug. 18, 1945; minimum daily, 19 ft³/s (0.54 m³/s) Aug. 16, 1936; minimum gage height, 2.70 ft (0.823 m) Oct. 8, 1966.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,000 ft³/s (28.3 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 5	1300	*1,650	46.7	*7.48	2.280	Mar. 13	2100	1,060	30.0	5.83	1.777

Minimum discharge, 88 ft³/s (2.49 m³/s) July 28, gage height, 3.04 ft (0.927 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	207	241	270	180	200	700	583	235	146	113	106	173
2	209	243	275	180	200	683	550	225	152	114	105	188
3	211	243	290	180	205	675	519	214	147	109	110	194
4	210	238	290	180	200	882	473	213	144	113	111	192
5	211	234	280	180	200	1500	491	213	148	144	127	192
6	242	230	265	180	195	1190	493	209	153	136	154	187
7	246	229	250	180	200	991	480	201	152	142	148	180
8	243	227	245	180	210	509	468	202	149	145	145	176
9	240	225	240	180	220	556	435	196	149	139	140	172
10	235	225	230	180	230	684	409	188	145	131	145	172
11	232	225	220	180	245	802	392	183	144	123	144	166
12	227	225	215	180	250	854	373	180	144	120	142	161
13	228	224	210	180	250	1020	359	175	144	118	137	162
14	224	223	205	185	250	1050	349	170	141	111	136	163
15	219	223	200	175	250	1020	320	171	135	108	133	163
16	220	223	200	180	255	939	306	169	134	106	135	164
17	214	224	195	180	260	803	304	168	130	106	138	167
18	214	228	190	180	265	687	304	167	127	105	144	217
19	215	228	190	180	275	615	301	160	129	109	142	308
20	222	228	190	180	290	544	308	158	127	107	144	372
21	226	228	180	180	310	497	321	155	118	105	144	358
22	231	228	185	180	350	470	320	154	116	101	146	326
23	231	228	185	180	430	460	313	153	114	99	146	271
24	228	227	185	180	600	440	298	153	115	98	151	257
25	234	223	180	180	720	425	294	151	117	100	149	287
26	236	230	180	185	740	410	282	151	116	97	148	318
27	232	259	180	185	720	400	269	147	114	94	149	320
28	230	269	180	190	720	410	257	143	111	92	152	287
29	231	270	180	190	---	526	242	141	113	95	182	269
30	227	275	180	195	---	604	238	139	113	100	179	261
31	232	---	180	200	---	602	---	140	---	104	176	---
TOTAL	7007	7023	6645	5645	9240	21948	11051	5424	3987	3484	4408	6823
MEAN	226	234	214	182	330	708	368	175	133	112	142	227
MAX	246	275	290	200	740	1500	583	235	153	145	182	372
MIN	207	223	180	175	195	400	238	139	111	92	105	161
CFSM	.54	.56	.51	.44	.79	1.70	.89	.42	.32	.27	.34	.55
IN.	.63	.63	.59	.50	.83	1.96	.99	.49	.36	.31	.39	.61

CAL YR 1976 TOTAL 197022 MEAN 538 MAX 2760 MIN 178 CFSM 1.29 IN 17.62
WTR YR 1977 TOTAL 92685 MEAN 254 MAX 1500 MIN 92 CFSM .61 IN 8.29

04155000 PINE RIVER AT ALMA, MI

LOCATION.--Lat 43°22'46", long 84°39'20", in SW¼ SE¼ sec.34, T.12 N., R.3 W., Gratiot County, Hydrologic Unit 04080202, on right bank 270 ft (32 m) downstream from Superior Street Bridge in Alma, 0.6 mi (1.0 km) downstream from municipal reservoir, and 38 mi (61 km) upstream from mouth.

DRAINAGE AREA.--288 mi² (746 km²).

PERIOD OF RECORD.--October 1930 to current year. Gage-height records for flood seasons collected in this vicinity 1910-28 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 744: Drainage area. WSP 1307: 1945(M). WSP 1337: 1931, 1932-34(M), 1936, 1939, 1945, 1949.

GAGE.--Water-stage recorder. Datum of gage is 718.37 ft (218.959 m) above mean sea level. Prior to Dec. 10, 1930, nonrecording gage at Superior Street Bridge at different datum. Dec. 10, 1930, to June 15, 1938, nonrecording gage at site 70 ft (21 m) downstream from bridge and June 16 to October 25, 1938, nonrecording gage at bridge at present datum.

REMARKS.--Records fair except those for the winter period, and those for period of no gage-height record, Nov. 29 to Mar. 8, which are poor. Occasional regulation caused by dam 0.6 mi (1.0 km) above station and by variable backwater from powerplant at St. Louis, 5.2 mi (8.4 km) below station. Since July 1965, about 2.5 ft³/s (0.07 m³/s) diverted above station for municipal and industrial use; sewage effluent is returned below station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--47 years, 213 ft³/s (6.032 m³/s), 10.04 in/yr (255 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,400 ft³/s (125 m³/s) Mar. 19, 1948, gage height, 10.81 ft (3.295 m); minimum daily, 0.40 ft³/s (0.011 m³/s) Sept. 6, 1964, caused by closing dam during construction of waterworks.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,120 ft³/s (31.7 m³/s) Sept. 19, gage height, 6.03 ft (1.838 m); minimum, 0.80 ft³/s (0.023 m³/s) May 17; minimum gage height, 0.48 ft (0.146 m) July 28, 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	99	146	160	105	105	250	402	189	88	61	51	120
2	98	136	155	105	105	350	419	176	86	58	55	110
3	112	137	150	105	110	310	400	163	105	64	58	120
4	107	133	150	105	110	280	380	156	123	68	67	138
5	86	137	150	105	110	550	401	161	131	96	84	149
6	128	131	145	105	110	370	368	149	125	90	78	137
7	88	150	140	105	115	390	352	143	104	82	81	107
8	101	140	135	105	115	610	331	139	122	82	93	80
9	140	122	125	105	115	509	323	129	141	87	99	68
10	163	117	120	105	115	614	292	142	149	87	123	50
11	158	114	115	105	120	667	281	131	154	83	105	49
12	131	113	115	105	120	652	230	140	149	83	117	51
13	122	120	110	105	120	638	234	147	140	79	118	53
14	120	141	110	105	120	612	223	154	142	71	113	56
15	115	149	105	105	120	587	210	92	143	70	100	60
16	121	130	105	105	125	557	201	134	130	60	88	63
17	134	117	105	105	125	508	194	29	96	52	78	63
18	127	107	105	100	125	473	196	14	102	48	73	210
19	111	119	105	100	130	419	179	44	90	51	69	825
20	98	124	105	100	155	378	190	87	79	51	63	656
21	96	152	105	100	170	341	201	98	67	55	58	477
22	88	153	105	100	150	322	214	86	58	51	58	575
23	94	127	105	100	130	318	239	90	55	45	54	536
24	128	119	105	100	190	306	267	88	51	44	55	482
25	142	141	105	100	225	304	287	82	52	47	54	416
26	128	176	105	100	220	299	278	81	49	45	54	360
27	113	184	105	100	215	287	258	81	45	44	52	303
28	107	168	105	100	210	284	241	80	44	42	52	277
29	97	165	105	100	---	317	235	77	41	40	111	277
30	112	160	105	100	---	306	199	73	44	44	102	266
31	144	---	105	105	---	353	---	77	---	50	116	---
TOTAL	3608	4128	3665	3190	3880	13161	8225	3432	2905	1930	2479	7134
MEAN	116	138	118	103	139	425	274	111	96.8	62.3	80.0	238
MAX	163	184	160	105	225	667	419	189	154	96	123	825
MIN	86	107	105	100	105	250	179	14	41	40	51	49
CFSM	.40	.48	.41	.36	.48	1.48	.95	.39	.34	.22	.28	.83
IN.	.47	.53	.47	.41	.50	1.70	1.06	.44	.38	.25	.32	.92

CAL YR 1976 TOTAL 128081 MEAN 350 MAX 2270 MIN 58 CFSM 1.22 IN 16.54
WTR YR 1977 TOTAL 57737 MEAN 158 MAX 825 MIN 14 CFSM .55 IN 7.46

04155500 PINE RIVER NEAR MIDLAND, MI

LOCATION.--Lat 43°33'52", long 84°22'09", in SW¼ NW¼ sec.4, T.13 N., R.1 E., Midland County, Hydrologic Unit 04080202, on left bank at downstream side of bridge on Meridian Road, 7.2 mi (11.6 km) southwest of Midland, and 7.8 mi (12.6 km) upstream from Chippewa River.

DRAINAGE AREA.--390 mi² (1,010 km²), approximately.

PERIOD OF RECORD.--May 1934 to September 1938, February 1948 to current year.

REVISED RECORDS.--WSP 1207: Drainage area. WSP 1307: 1935(M). WSP 1337: 1936-38, 1948-49.

GAGE.--Water-stage recorder. Datum of gage is 623.94 ft (190.177 m) above mean sea level. Prior to Sept. 30, 1938, nonrecording gage at same site, at datum 5.55 ft (1.692 m) lower. Feb. 3, 1948, to Dec. 13, 1951, nonrecording gage at present site and datum.

REMARKS.--Records good except those for the winter period, and those for period of no gage-height record, July 13 to Aug. 30, which are poor. Regulation at low and medium flows by hydroelectric powerplant at St. Louis. Some diversion above station for irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--33 years, 296 ft³/s (8.383 m³/s), 10.31 in/yr (262 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,360 ft³/s (180 m³/s) Mar. 20, 1948, gage height, 10.00 ft (3.048 m), from graph based on gage readings; maximum gage height, 12.08 ft (3.682 m) Feb. 2, 1968, backwater from ice; minimum discharge, not determined.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,280 ft³/s (64.6 m³/s) Sept. 20, gage height, 6.69 ft (2.039 m), only peak above base of 1,200 ft³/s (34.6 m³/s); minimum daily, 50 ft³/s (1.42 m³/s) Jan. 20, 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	109	124	155	86	88	250	410	170	120	109	78	151
2	111	172	150	86	94	280	452	170	149	99	84	229
3	84	150	145	84	96	350	525	168	113	95	96	100
4	97	171	140	84	98	430	433	157	111	103	115	112
5	132	149	135	84	100	490	490	153	114	157	110	136
6	146	188	130	84	100	470	471	151	127	110	120	150
7	149	111	130	82	100	370	374	152	175	159	135	167
8	137	141	125	82	105	430	423	153	117	11[illegible]	150	184
9	99	206	120	82	105	500	315	151	129	137	160	139
10	106	156	115	80	105	560	385	108	118	119	155	167
11	140	163	115	80	105	640	251	143	128	145	165	86
12	184	157	110	80	110	720	362	110	135	119	165	84
13	149	154	105	80	110	700	197	145	145	100	160	84
14	126	109	105	78	110	681	238	158	118	100	140	86
15	140	118	100	78	110	646	239	160	117	90	125	86
16	105	221	98	74	110	614	228	139	129	74	110	99
17	98	164	98	66	110	575	223	164	163	70	105	109
18	115	182	96	58	110	506	182	99	126	70	96	96
19	153	104	94	54	110	492	235	87	105	74	88	613
20	158	154	92	50	110	429	186	91	104	74	84	1960
21	139	102	92	52	120	390	212	94	110	70	82	864
22	137	131	92	54	130	382	220	133	101	64	76	710
23	139	239	90	52	150	320	221	95	90	62	78	736
24	92	229	90	50	290	350	238	111	83	65	76	678
25	102	122	90	52	350	324	282	131	84	62	76	661
26	156	102	88	54	290	313	291	120	83	60	74	570
27	175	197	88	56	260	313	276	116	88	58	74	537
28	165	180	88	60	240	326	263	113	88	56	86	425
29	153	170	86	68	---	348	199	114	90	60	105	350
30	125	160	86	76	---	424	243	114	94	68	120	372
31	97	---	86	80	---	296	---	116	---	72	119	---
TOTAL	4018	4726	3334	2186	3916	13919	9064	4086	3454	2813	3407	10741
MEAN	130	158	108	70.5	140	449	302	132	115	90.7	110	358
MAX	184	239	155	86	350	720	525	170	175	159	165	1960
MIN	84	102	86	50	88	250	182	87	83	56	74	84
CFSM	.33	.41	.28	.18	.36	1.15	.77	.34	.30	.23	.28	.92
IN.	.38	.45	.32	.21	.37	1.33	.86	.39	.33	.27	.32	1.02

CAL YR 1976 TOTAL 166377 MEAN 455 MAX 3590 MIN 83 CFSM 1.17 IN 15.87
WTR YR 1977 TOTAL 65664 MEAN 180 MAX 1960 MIN 50 CFSM .46 IN 6.26

04156000 TITTABAWASSEE RIVER AT MIDLAND, MI

LOCATION.--Lat 43°35'43", long 84°14'08", in NW¼ NE¼ sec.28, T.14 N., R.2 E., Midland County, Hydrologic Unit 04080201, on right bank 2,000 ft (610 m) downstream from dam at Dow Chemical Co. powerplant in Midland, 0.7 mi (1.1 km) upstream from Bullock Creek, 1.4 mi (2.3 km) downstream from Chippewa River and 23 mi (37 km) upstream from mouth.

DRAINAGE AREA.--2,400 mi² (6,200 km²), approximately.

PERIOD OF RECORD.--March 1936 to current year. Gage-height records for flood seasons collected in this vicinity 1910-26, 1928, and since 1946 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1045: 1945. WSP 1144: 1948.

GAGE.--Water-stage recorder. Datum of gage is 580.28 ft (176.869 m) above mean sea level. Prior to Sept. 30, 1955, at datum 10.00 ft (3.048 m) higher.

REMARKS.--Records good except those for the winter period, which are fair. Water is diverted from river a short distance above station for industrial use. Small part returned to river at gage, small part returned to river 0.25 mi (0.4 km) below station, remainder returned 1 mi (1.6 km) below. Extremes and daily discharges not adjusted for diversion. Prior to May 20, 1970, discharge below 4,000 ft³/s (113 m³/s) regulated by dam 2,000 ft (610 m) above station; fixed crest dam since. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--41 years, 1,661 ft³/s (47.04 m³/s), 9.40 in/yr (239 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 34,000 ft³/s (963 m³/s) Mar. 21, 1948, gage height, 29.50 ft (8.992 m); minimum, 39 ft³/s (1.10 m³/s) Oct. 12, 1942; minimum daily, 111 ft³/s (3.14 m³/s) Aug. 21, 1949; minimum gage height, 9.04 ft (2.755 m) Aug. 19, 1954, caused by bridge construction above station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known since at least 1907, 29.7 ft (9.05 m) Mar. 28, 1916, discharge, 34,800 ft³/s (986 m³/s), from information by U.S. Weather Bureau.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,880 ft³/s (138 m³/s) Mar. 12, gage height, 15.51 ft (4.727 m), no peak above base of 7,000 ft³/s (198 m³/s); minimum, 168 ft³/s (4.76 m³/s) Aug. 2, gage height, 9.37 ft (2.856 m); minimum daily, 209 ft³/s (5.92 m³/s) July 31.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	572	580	846	400	740	1750	2460	600	455	365	281	976
2	463	819	853	300	720	1500	1810	776	485	296	288	1140
3	417	819	802	480	980	1800	1460	811	500	272	284	516
4	539	1010	481	740	1030	2390	1880	793	425	276	288	413
5	563	1050	393	700	640	4110	2140	952	395	365	397	441
6	824	595	726	760	430	3950	2440	1080	585	475	350	974
7	817	445	925	770	640	3070	2490	567	715	720	367	828
8	683	587	1010	450	680	2740	2420	485	540	665	474	808
9	503	655	967	400	700	3130	1490	801	510	440	474	745
10	473	767	866	560	1000	3380	978	636	515	365	812	472
11	789	799	499	780	960	4080	830	777	415	420	651	375
12	857	789	350	740	700	4290	1380	611	410	390	662	476
13	689	532	766	760	340	4110	1780	578	540	385	379	647
14	754	425	918	490	700	3870	1580	514	675	417	322	673
15	608	716	903	420	720	3760	1130	485	525	432	461	511
16	464	830	823	350	780	3610	806	588	495	322	478	510
17	428	813	1070	540	940	3510	680	558	525	306	633	397
18	718	820	458	780	730	3270	1190	510	410	385	661	447
19	782	927	323	640	580	1830	1100	480	325	395	625	1180
20	714	499	654	720	520	1350	1010	460	465	356	360	3230
21	941	378	780	760	500	1710	1150	370	435	320	308	2710
22	802	669	760	480	640	1940	1850	370	415	305	454	2070
23	544	828	660	310	1500	1580	1020	485	410	278	565	2250
24	462	831	400	400	2000	1770	775	475	385	251	745	1610
25	741	434	270	700	3300	1470	1680	490	292	316	866	1090
26	822	673	330	710	2000	1100	1620	475	264	302	505	1610
27	845	563	600	740	1000	902	1870	480	350	302	338	2310
28	1000	536	740	680	1200	1190	1260	345	320	300	304	1870
29	817	625	540	760	---	1760	930	300	300	296	626	1350
30	517	632	600	560	---	2130	700	292	330	236	769	912
31	435	---	520	710	---	2350	---	435	---	209	747	---
TOTAL	20583	20646	20833	18590	26670	79402	43909	17579	13411	11162	15474	33541
MEAN	664	688	672	600	953	2561	1464	567	447	360	499	1118
MAX	1000	1050	1070	780	3300	4290	2490	1080	715	720	866	3230
MIN	417	378	270	300	340	902	680	292	264	209	281	375
+	32.0	44.6	35.9	32.3	25.7	44.4	45.4	29.2	26.3	24.2	25.4	23.2
MEAN‡	696	733	708	632	979	2605	1509	596	473	384	524	1141
CFSM‡	.29	.31	.30	.26	.41	1.09	.63	.25	.20	.16	.22	.48
IN‡	.33	.34	.34	.30	.42	1.25	.70	.29	.22	.18	.25	.53

CAL YR 1976 TOTAL 967418 MEAN 2643 MAX 24800 MIN 270 MEAN‡ 2681 CFSM‡ 1.12 IN‡ 15.18
WTR YR 1977 TOTAL 321800 MEAN 882 MAX 4290 MIN 209 MEAN‡ 914 CFSM‡ .38 IN‡ 5.15

+Diversion in cubic feet per second, for industrial use; furnished by Dow Chemical Co.
‡Adjusted for diversion made by Dow Chemical Co.

04157000 SAGINAW RIVER AT SAGINAW, MI

LOCATION.--Lat 43°24'46", long 83°57'47", in NW¼ SE¼ sec.26, T.12 N., R.4 E., Saginaw County, Hydrologic Unit 04080206, on right bank 1,000 ft (305 m) downstream from bridge on Rust Avenue in Saginaw, 1.9 mi (3.1 km) downstream from Tittabawassee River and 20.3 mi (32.7 km) upstream from mouth. Water quality sampling site at downstream side of bridge on Rust Avenue. Water quality monitor located 1,000 ft (305 m) downstream on downstream side of bridge on Court Street.

DRAINAGE AREA.--6,060 mi² (15,700 km²), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--1904, 1908-9, 1912-13, 1916, 1918-19, 1929-30, and 1942 (flood discharge for certain periods only) in WSP 1084: December 1942 to current year (high-water periods only); no high water 1944, 1949, 1953, 1955, 1958, 1961, 1963, 1964, 1966. Gage-height records for flood seasons collected in this vicinity 1910-20, and for entire years since 1921 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 565.11 ft (172.246 m), International Great Lakes datum. Prior to Oct. 1, 1972, non-recording gage at site 1.9 mi (3.1 km) downstream at same datum. Auxiliary water-stage recorder on right bank near Alpin Beach, 19.9 mi (32.0 km) downstream.

REMARKS.--Water-discharge records good. Considerable diversion through metropolitan area of Saginaw. Corps of Engineers gage-height telemark at station.

COOPERATION.--Auxiliary gage-height record furnished by NOAA-National Ocean Survey.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 68,000 ft³/s (1,930 m³/s) Mar. 30, 1904, gage height, 24.9 ft (7.59 m), site then in use.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 14,100 ft³/s (399 m³/s) Mar. 9; maximum daily gage height, 15.38 ft (4.688 m) Oct. 6.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						---						
2						---						
3						---						
4						---						
5						---						
6						10600						
7						11000						
8						11800						
9						14100						
10						11300						
11						12100						
12						11700						
13						12000						
14						11300						
15						10300						
16						10000						
17						---						
18						---						
19						---						
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30						---						
31						---						

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to current year.
WATER TEMPERATURES: November 1974 to current year.

INSTRUMENTATION.--Water-quality monitor since Nov. 6, 1976.

REMARKS.--Once-daily specific conductance and temperature records are based on measurements between 1700 and 2000 hours. Interruptions in the record were due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1975 and 1977): Maximum recorded, 1,230 micromhos Jan. 5, 1977; minimum recorded, 224 micromhos Mar. 13, 1977.
WATER TEMPERATURES: Maximum daily, 30.0°C July 10, 14, 20, 1977; minimum daily, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum daily, 30.0°C July 10, 14, 20; minimum daily, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UM-MF (COL./100 ML)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)
OCT 13...	1100	2990	738	8.0	13.5	8.5	84	B11000	540	100	260	71
NOV 05...	1130	1950	747	8.2	5.0	12.6	98	E6000	290	130	280	91
DEC 01...	1200	--	980	7.9	.0	12.8	90	B1000	50	560	340	110
JAN 19...	1230	--	960	7.5	.0	12.7	89	43000	6400	3300	320	82
FEB 16...	1500	E747	1020	7.8	.0	8.5	59	2300	B160	490	--	--
MAR 11...	1300	9570	479	7.8	3.0	9.8	73	5400	B55	420	200	44
APR 08...	1245	8300	596	8.0	5.0	13.8	107	B6000	190	3800	240	68
MAY 06...	1230	1520	734	7.7	18.0	8.5	91	4500	62	62	300	110
JUN 10...	1145	1330	770	8.6	20.0	12.6	137	25000	810	B58	270	81
JUL 15...	1300	1820	831	8.6	27.5	12.1	153	B2000	B63	B23	270	86
AUG 05...	1200	1290	837	--	25.0	7.0	84	410000	--	B50	270	--
SEP 16...	1200	3050	820	8.2	20.0	6.1	67	B40000	B730	B30	270	98

DATE	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)
OCT 13...	68	22	47	1.3	3.4	230	0	189	3.7	62	93	.2
NOV 05...	74	22	47	1.2	3.2	230	0	189	2.3	67	97	.2
DEC 01...	88	29	55	1.3	4.5	280	0	230	5.6	67	120	.3
JAN 19...	86	26	58	1.4	3.5	290	0	238	15	66	130	.3
FEB 16...	--	--	--	--	--	280	0	230	7.1	60	140	.2
MAR 11...	55	14	17	.5	3.9	190	0	156	4.8	41	35	.2
APR 08...	66	19	23	.6	3.0	210	0	172	3.4	66	53	.2
MAY 06...	83	23	38	1.0	3.6	230	0	189	7.3	65	82	.2
JUN 10...	72	22	60	1.6	4.1	210	10	189	.9	63	88	.2
JUL 15...	73	22	66	1.7	4.3	200	12	184	.9	49	140	.2
AUG 05...	71	23	66	1.7	4.3	--	--	--	--	56	140	.3
SEP 16...	70	24	56	1.5	4.3	210	0	172	2.1	62	120	.3

E--ESTIMATED VALUE
B--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	SUS-PENDED SEDI-MENT (MG/L)	SUS-PENDED SEDI-MENT DIS-CHARGE (T/DAY)	SUS. SED. SIEVE DIAM. % FINER THAN .062 MM
OCT 13...	3.8	432	413	3490	.27	1.4	6.1	.22	44	355	100
NOV 05...	3.8	480	427	2530	.32	1.3	5.8	.21	6	32	100
DEC 01...	3.2	557	505	--	.66	2.2	9.6	.33	10	--	100
JAN 19...	8.8	555	522	--	.59	2.6	11	.31	0	--	--
FEB 16...	8.7	544	--	E1100	.65	2.5	11	.33	9	E18	100
MAR 11...	6.1	282	266	7290	1.1	2.9	13	.27	66	1710	100
APR 08...	4.1	390	338	8740	1.5	2.7	12	.13	41	919	100
MAY 06...	1.8	498	410	2040	.40	2.3	10	.27	47	193	100
JUN 10...	.8	506	424	1820	.36	3.0	13	.46	46	165	100
JUL 15...	.3	541	465	2660	.56	3.1	14	.54	44	216	100
AUG 05...	1.9	539	--	1880	.66	2.9	13	.61	55	192	100
SEP 16...	5.0	470	445	3870	.85	2.5	11	.41	37	305	100

DATE	TIME	TOTAL ARSENIC (AS) (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	TOTAL CAD-MIUM (CD) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (LG/L)	TOTAL CHRO-MIUM (CR) (UG/L)	DIS-SOLVED CHRO-MIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	TOTAL IRON (FE) (UG/L)
OCT 13...	1100	3	2	1	1	<10	<10	0	0	10	0	1100
JAN 19...	1230	0	0	3	3	<10	<10	1	1	0	0	210
APR 08...	1245	2	1	1	1	10	10	0	0	10	0	1300
JUL 15...	1300	5	4	10	8	30	1	0	0	13	3	2600

DATE	DIS-SOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	TOTAL MAN-GANESE (MN) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (LG/L)	TOTAL MERCURY (HG) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	TOTAL SELE-NIUM (SE) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	TOTAL ZINC (ZN) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	TOTAL ORGANIC CARBON (C) (MG/L)
OCT 13...	110	12	10	80	20	<.5	<.5	0	0	20	10	9.3
JAN 19...	50	11	11	70	70	<.5	<.5	0	0	--	30	8.6
APR 08...	70	10	5	70	20	<.5	<.5	1	0	30	10	11
JUL 15...	30	160	23	140	0	.0	.0	0	0	50	30	7.6

E--ESTIMATED VALUE

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

	DATE	OCT 13,76	NOV 5,76	DEC 1,76	JAN 19,77	FEB 16,77
	TIME	1100	1130	1200	1238	1500
	TOTAL CELLS/ML	13000	4700	2800	13000	5300
DIVERSITY:	DIVISION	1.4	1.5	0.8	0.3	0.7
	.CLASS	1.4	1.6	0.8	0.3	0.7
	..ORDER	2.0	2.4	1.7	0.3	0.8
	...FAMILY	2.5	3.1	2.0	0.3	1.0
	....GENUS	3.1	3.4	2.3	0.3	1.0

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHAPACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	560	4	130	3	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	110	1	330	7	18	1	--	-	*	0
....CHODATELLA	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	110	1	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
....TRFUBARIA	--	-	--	-	--	-	--	-	--	-
....WESTELLA	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	130	3	140	5	--	-	--	-
....SCENEDESMUS	670	5	330	7	130	5	*	0	140	3
....TETRASTRUM	450	3	--	-	--	-	--	-	--	-
..TETRASPORALES										
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..ULOTRICHALES										
...ULOTRICHACEAE										
....ULOTHRIX	--	-	--	-	110	4	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	220	2	160	3	54	2	*	0	36	1
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...CHAETOCERACEAE										
....CHAETOCEROS	--	-	98	2	--	-	--	-	--	-
...COSCINODISCACEAE										
....CYCLOTELLA	2900#	22	1700#	36	1600#	56	82	1	72	1
....MELOSIRA	3900#	29	65	1	36	1	*	0	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-	*	0
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	*	0
...CYMBELLACEAE										
....AMPHORA	--	-	33	1	18	1	--	-	--	-
....CYMBELLA	110	1	--	-	--	-	--	-	*	0
....EPITHEMIA	--	-	--	-	--	-	*	0	--	-
...DIATOMACEAE										
....DIATOMA	--	-	33	1	--	-	*	0	*	0
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	33	1	--	-	--	-	--	-
....FRAGILARIA	110	1	--	-	--	-	*	0	--	-
....SYNEDRA	--	-	65	1	--	-	--	-	*	0
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	33	1	--	-	--	-	36	1
...NAVICULACEAE										
....DIPLONEIS	--	-	--	-	18	1	--	-	--	-
....NAVICULA	1100	8	490	10	270	10	230	2	130	2
....NEIDIUM	220	2	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	560	4	200	4	330	12	--	-	190	4
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	*	0
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	110	1	33	1	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	OCT 13,76 1100		NOV 5,76 1130		DEC 1,76 1200		JAN 19,77 1230		FEB 16,77 1500	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCOCCALES										
...CHROCOCCACEAE										
....AGMENELLUM	1800	13	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	130	3	--	-	--	-	--	-
..HORMOGONALES										
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	520	11	--	-	12000#	96	4600#	86
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	220	2	--	-	--	-	*	0	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	220	2	98	2	--	-	*	0	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	98	2	18	1	--	-	--	-
....PHACUS	--	-	33	1	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	72	3	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	MAY 6,77	JUN 10,77	JUL 15,77	AUG 5,77	SEP 16,77
TIME	1230	1145	1300	1200	1200
TOTAL CELLS/ML	29000	74000	96000	55000	59000
DIVERSITY: DIVISION	1.2	1.0	1.5	1.6	1.7
.CLASS	1.2	1.0	1.5	1.6	1.7
..ORDER	1.7	1.2	1.7	2.3	2.4
...FAMILY	2.7	2.4	2.1	2.6	3.1
....GENUS	2.8	2.8	2.5	2.7	3.7

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	*	0	2300	4
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	12000#	17	6100	6	7100	13	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	3100	4	--	-	--	-	--	-
....MICRACTINIUM	12000#	41	12000#	16	--	-	--	-	1900	3
...OOCYSTACEAE										
....ANKISTRODESMUS	4400#	15	1700	2	670	1	320	1	1500	2
....CHODATELLA	--	-	--	-	*	0	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	3300	6
....KIRCHNERIELLA	--	-	--	-	*	0	*	0	--	-
....OOCYSTIS	*	0	--	-	1800	2	--	-	2700	5
....TETRAEDRON	--	-	--	-	*	0	--	-	--	-
....TREUBARIA	--	-	--	-	*	0	--	-	--	-
....WESTELLA	--	-	--	-	900	1	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	560	2	4200	6	--	-	--	-	--	-
....SCENEDESMUS	1800	6	21000#	28	16000#	17	10000#	18	6400	11
....TETRASTRUM	--	-	--	-	--	-	--	-	830	1
..TETRASPORALES										
...PALMELLACEAE										
....SPHAEROCYSTIS	420	1	--	-	--	-	--	-	--	-
..ULOTRICHALES										
...ULOTRICHACEAE										
....ULOTHRIX	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	840	3	1600	2	*	0	630	1	420	1
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...CHAETOCERACEAE										
....CHAETOCEROS	--	-	--	-	--	-	--	-	--	-
...COSCINODISCACEAE										
....CYCLOTELLA	4400#	15	14000#	19	42000#	43	10000#	18	5800	10
....MELOSIRA	*	0	--	-	7600	8	--	-	2300	4
....STEPHANODISCUS	--	-	--	-	--	-	--	-	2300	4
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	*	0
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	--	-	--	-	--	-
....EPITHEMIA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	*	0	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-	--	-
....SYNEDRA	980	3	--	-	--	-	1600	3	2300	4
...GOMPHONEMATACEAE										
....GOMPHONEMA	*	0	--	-	--	-	--	-	2300	4
...NAVICULACEAE										
....DIPLONEIS	--	-	--	-	--	-	--	-	--	-
....NAVICULA	420	1	--	-	--	-	--	-	1000	2
....NEIDIUM	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	1100	4	1400	2	2200	2	--	-	620	1
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAY 6,77 1230		JUN 10,77 1145		JUL 15,77 1300		AUG 5,77 1200		SEP 16,77 1200	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCOCCALES										
...CHROCOCCACEAE										
....AGMENELLUM	--	-	--	-	--	-	9500#	17	8700	15
....ANACYSTIS	1100	4	*	0	16000#	17	--	-	420	1
..HORMOGONALES										
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	--	-	1100	1	14000#	26	12000#	21
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	1600	2	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	560	2	--	-	*	0	--	-	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	790	1	--	-
....PHACUS	--	-	--	-	--	-	320	1	--	-
....TRACHELOMONAS	--	-	870	1	--	-	--	-	830	1

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

PERIPHYTON

DATE	LENGTH OF EXPOSURE (DAYS)	BIOMASS CHLOROPHYLL RATIO PERIPHYTON (UNITS)	PERIPHYTON BIOMASS ASH WEIGHT G/SQ M	PERIPHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)	CHLOR-B PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)
AUG 05...	21	1316	12.2	18.7	4.94	1.95

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	ONCE DAILY		MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCT	NOV		NOVEMBER			DECEMBER			JANUARY	
1	625	725	---	---	---	991	882	931	1020	941	980
2	743	749	---	---	---	917	826	872	995	928	952
3	614	860	---	---	---	965	815	870	1090	1000	1030
4	618	738	---	---	---	995	850	909	1200	1100	1140
5	664	781	---	---	---	925	838	866	1230	955	1090
6	625	676	694	674	681	926	848	889	994	905	938
7	664	---	780	686	747	1090	884	965	962	910	931
8	542	---	804	672	723	1050	859	928	959	903	926
9	---	---	877	753	799	910	851	874	965	922	942
10	554	---	940	805	903	911	811	837	966	909	924
11	581	---	858	770	814	927	849	876	1120	967	1010
12	818	---	870	715	777	943	904	923	1110	959	1040
13	745	---	862	707	763	972	869	896	985	926	956
14	756	---	836	735	779	1120	945	1050	975	918	944
15	747	---	791	726	757	1100	980	1060	957	924	944
16	695	---	938	798	876	1030	868	940	958	921	928
17	636	---	940	731	800	934	843	886	974	964	967
18	648	---	820	771	798	848	715	782	1130	980	1050
19	682	---	887	769	800	814	784	797	1120	976	1070
20	671	---	865	779	824	894	785	813	992	924	962
21	689	---	836	717	779	1060	887	969	981	924	951
22	---	---	899	736	764	1050	879	944	981	915	947
23	673	---	1110	877	952	978	876	924	933	906	920
24	754	---	1070	856	943	984	894	929	906	902	905
25	---	---	901	787	860	980	896	950	1060	906	972
26	880	---	865	749	787	920	879	895	1060	942	1010
27	768	---	993	755	832	1020	926	998	951	906	923
28	743	---	884	772	797	1100	1030	1070	932	897	915
29	718	---	882	778	841	1150	973	1050	966	872	923
30	691	---	966	836	865	975	871	935	970	876	935
31	---	---	---	---	---	1010	885	965	1020	927	949
MONTH	---	---	1110	672	810	1150	715	922	1230	872	970

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1	---	---	---	686	636	668	663	568	605	713	613	696
2	---	---	---	675	641	657	631	235	386	725	581	697
3	---	---	---	644	574	624	638	293	521	760	730	743
4	---	---	---	589	293	387	628	307	523	765	523	721
5	---	---	---	315	279	292	572	319	485	672	365	478
6	---	---	---	290	259	278	595	571	584	767	676	744
7	---	---	---	355	253	284	611	370	514	825	743	764
8	---	---	---	417	336	380	619	560	580	767	680	712
9	---	---	---	471	401	447	620	568	583	815	705	768
10	---	---	---	481	391	441	648	575	602	1010	802	896
11	---	---	---	485	448	467	685	643	663	945	776	836
12	---	---	---	478	227	347	741	669	687	900	788	849
13	---	---	---	291	224	258	750	639	712	934	815	869
14	---	---	---	256	247	251	724	611	648	829	776	810
15	1080	1020	1050	491	247	342	704	615	657	884	797	852
16	1080	934	996	562	499	526	701	637	665	889	815	836
17	981	849	914	572	544	555	656	592	628	940	858	903
18	916	566	712	543	291	349	---	---	---	---	---	---
19	790	619	725	310	286	299	---	---	---	---	---	---
20	817	766	794	341	303	329	---	---	---	---	---	---
21	815	782	798	336	320	326	---	---	---	---	---	---
22	803	659	735	680	336	526	---	---	---	---	---	---
23	656	412	532	645	456	604	---	---	---	---	---	---
24	396	299	338	700	622	660	---	---	---	---	---	---
25	403	343	371	696	639	670	---	---	---	---	---	---
26	608	356	553	688	614	655	801	688	744	---	---	---
27	570	390	450	673	312	607	686	663	677	---	---	---
28	632	436	531	312	285	302	687	664	679	---	---	---
29	---	---	---	723	295	509	697	657	671	---	---	---
30	---	---	---	718	620	661	709	695	702	---	---	---
31	---	---	---	667	624	641	---	---	---	---	---	---
MONTH	1080	299	679	723	224	463	801	235	614	1010	365	775

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED
SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	---	---	---	915	885	900			
2	---	---	---	---	---	---	890	875	884			
3	---	---	---	---	---	---	890	875	880			
4	---	---	---	---	---	---	895	870	885			
5	---	---	---	1120	820	895	923	875	890			
6	---	---	---	1100	785	915	---	---	---			
7	---	---	---	975	750	825	---	---	---			
8	---	---	---	1020	845	895	---	---	---			
9	---	---	---	1150	870	960	---	---	---			
10	---	---	---	---	---	---	---	---	---			
11	---	---	---	---	---	---	---	---	---			
12	---	---	---	1050	840	880	---	---	---			
13	---	---	---	1210	930	1080	---	---	---			
14	955	690	830	1160	1020	1090	---	---	---			
15	935	820	890	1010	845	895	---	---	---			
16	900	805	860	975	850	915	860	830	840			
17	905	580	755	1020	975	1010	860	850	860			
18	845	425	480	1020	940	1000	840	820	840			
19	895	435	625	1120	955	1080	830	810	820			
20	910	765	850	1040	995	1020	810	790	800			
21	1080	815	945	985	955	975	775	770	770			
22	---	---	---	965	915	935	760	740	755			
23	---	---	---	945	905	925	725	720	720			
24	1070	640	895	955	925	935	715	710	715			
25	850	525	620	925	895	915	710	690	700			
26	930	860	900	970	920	940	690	673	680			
27	965	830	900	985	955	965	---	---	---			
28	985	835	935	980	940	960	---	---	---			
29	---	---	---	945	925	935	---	---	---			
30	---	---	---	950	930	940	---	---	---			
31	---	---	---	945	900	935	---	---	---			
MONTH	1080	425	807	1210	750	953	923	673	809			
YEAR	1230	224	785									

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	ONCE DAILY		MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCT	NOV		NOVEMBER			DECEMBER			JANUARY	
1	15.0	6.0	---	---	---	0.0	0.0	0.0	0.0	0.0	0.0
2	---	6.0	---	---	---	0.0	0.0	0.0	0.0	0.0	0.0
3	16.5	6.0	---	---	---	0.0	0.0	0.0	0.0	0.0	0.0
4	16.5	5.0	---	---	---	0.0	0.0	0.0	0.0	0.0	0.0
5	18.0	5.0	---	---	---	0.0	0.0	0.0	0.0	0.0	0.0
6	16.0	5.0	5.0	5.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0
7	13.0	---	5.0	5.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0
8	12.0	---	4.5	3.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0
9	---	---	3.5	2.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0
10	11.5	---	2.5	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0
11	11.5	---	2.5	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
12	13.0	---	2.0	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
13	13.0	---	2.0	1.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0
14	13.0	---	2.0	1.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0
15	11.5	---	2.0	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0
16	10.0	---	2.0	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0
17	9.5	---	2.0	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0
18	9.0	---	2.0	1.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0
19	8.0	---	2.5	2.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
20	7.5	---	3.0	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0
21	7.5	---	3.0	2.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0
22	---	---	2.5	1.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
23	7.0	---	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	6.5	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	---	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	6.5	---	1.5	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
27	6.0	---	3.0	1.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0
28	4.5	---	3.0	1.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0
29	5.0	---	1.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
30	5.5	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	---	---	---	---	---	0.0	0.0	0.0	0.0	0.0	0.0
MONTH	---	---	5.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	0.0	0.0	0.0	0.0	0.0	0.0	10.5	9.0	9.5	16.5	15.0	15.5
2	0.0	0.0	0.0	0.0	0.0	0.0	9.0	3.5	6.0	17.0	15.5	16.0
3	0.0	0.0	0.0	0.0	0.0	0.0	10.0	4.5	8.0	17.5	16.5	17.0
4	0.0	0.0	0.0	0.0	0.0	0.0	9.0	4.0	7.5	17.5	14.0	16.0
5	0.0	0.0	0.0	0.0	0.0	0.0	7.0	4.0	6.0	16.5	13.0	14.0
6	0.0	0.0	0.0	0.0	0.0	0.0	6.0	5.5	5.5	18.0	17.0	17.5
7	0.0	0.0	0.0	0.0	0.0	0.0	6.0	2.5	4.5	18.0	17.5	17.5
8	0.0	0.0	0.0	0.0	0.0	0.0	10.5	4.5	5.5	18.0	17.0	17.5
9	0.0	0.0	0.0	1.0	0.0	0.5	7.5	5.0	6.0	17.0	14.5	15.5
10	0.0	0.0	0.0	2.0	0.0	1.0	10.5	7.0	8.0	17.5	14.5	15.5
11	0.0	0.0	0.0	3.5	2.0	2.5	14.0	10.0	11.5	18.5	15.5	17.0
12	0.0	0.0	0.0	3.5	0.0	0.5	16.0	12.5	14.0	18.0	17.5	18.0
13	0.0	0.0	0.0	1.0	0.0	0.0	17.0	15.5	16.0	19.5	17.5	18.5
14	0.0	0.0	0.0	0.0	0.0	0.0	15.5	14.5	15.0	20.5	18.0	19.5
15	0.0	0.0	0.0	7.0	0.0	2.5	15.5	14.0	14.0	21.5	19.5	20.5
16	0.0	0.0	0.0	7.0	6.0	6.5	14.0	13.0	13.5	22.5	20.0	20.5
17	0.0	0.0	0.0	5.5	5.0	5.5	13.5	13.0	13.0	22.5	20.5	21.5
18	0.0	0.0	0.0	5.0	0.0	0.5	15.0	13.5	14.0	---	---	---
19	0.0	0.0	0.0	0.5	0.0	0.0	16.0	13.0	15.0	---	---	---
20	0.0	0.0	0.0	0.5	0.0	0.0	16.5	13.0	14.0	---	---	---
21	0.0	0.0	0.0	1.5	0.0	0.5	17.0	16.5	16.5	---	---	---
22	0.0	0.0	0.0	5.5	0.0	3.0	18.0	13.0	16.5	---	---	---
23	0.0	0.0	0.0	5.0	2.5	4.0	14.0	13.0	13.5	---	---	---
24	0.0	0.0	0.0	4.5	2.5	3.5	14.0	13.0	13.5	---	---	---
25	0.0	0.0	0.0	5.0	2.5	4.0	14.0	11.0	13.0	---	---	---
26	0.0	0.0	0.0	6.5	4.0	5.0	14.5	12.0	13.5	---	---	---
27	0.0	0.0	0.0	8.0	3.0	6.0	16.0	13.0	14.5	---	---	---
28	0.0	0.0	0.0	8.0	4.5	6.5	15.5	14.0	14.5	---	---	---
29	---	---	---	12.5	4.5	9.5	15.0	13.0	13.5	---	---	---
30	---	---	---	13.0	10.5	12.0	16.5	13.5	14.5	---	---	---
31	---	---	---	12.0	10.5	11.0	---	---	---	---	---	---
MONTH	0.0	0.0	0.0	13.0	0.0	2.5	18.0	2.5	11.5	22.5	13.0	17.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	22.5	18.5	21.0	24.0	23.5	23.5	25.0	24.0	24.5
2	---	---	---	22.5	21.5	22.0	24.0	23.0	24.0	24.0	23.0	23.5
3	---	---	---	23.5	22.0	22.5	25.0	23.5	24.0	23.5	22.0	22.5
4	---	---	---	21.5	19.0	20.0	25.0	23.5	24.0	22.5	22.5	22.5
5	---	---	---	27.5	23.0	24.0	25.5	24.0	25.0	22.5	22.0	22.5
6	---	---	---	28.5	24.0	26.0	25.5	24.5	25.0	23.0	21.5	22.0
7	---	---	---	27.0	25.5	26.0	26.0	25.0	25.5	22.0	21.5	22.0
8	---	---	---	29.0	26.0	27.5	25.5	25.0	25.0	22.5	21.5	21.5
9	---	---	---	29.5	26.0	28.5	26.0	24.5	25.0	22.0	21.5	21.5
10	---	---	---	30.0	28.0	29.0	25.5	24.5	24.5	21.5	21.0	21.5
11	21.5	17.5	19.5	29.5	27.5	28.5	24.5	24.0	24.5	21.5	20.0	20.5
12	17.5	17.0	17.5	27.0	25.0	25.5	24.0	22.5	23.0	20.0	19.5	19.5
13	19.0	17.0	18.0	29.5	26.0	27.5	23.5	22.5	23.0	19.5	19.0	19.5
14	21.5	18.0	19.5	30.0	28.5	29.0	24.0	23.0	23.5	20.0	18.0	18.5
15	24.0	21.0	22.0	29.5	27.0	27.5	25.0	23.0	24.0	18.5	18.0	18.5
16	24.5	22.5	23.5	29.0	27.5	28.5	24.0	23.5	24.0	18.0	18.0	18.0
17	25.5	22.0	23.5	29.5	28.5	29.0	23.5	23.0	23.0	19.0	18.0	18.5
18	24.0	21.5	23.0	29.0	28.5	29.0	23.0	21.5	22.0	20.0	18.5	19.0
19	25.5	21.5	23.0	29.5	28.0	28.5	22.0	21.0	21.5	20.0	19.0	19.5
20	25.0	23.0	24.0	30.0	28.0	29.0	21.5	20.0	20.5	19.5	18.0	18.5
21	24.5	23.0	24.0	29.5	28.5	29.0	20.5	20.0	20.5	18.0	17.0	17.5
22	25.5	24.0	24.5	28.5	27.5	28.0	21.0	20.0	20.5	17.0	16.5	16.5
23	26.0	24.0	25.0	28.0	27.0	27.5	21.0	20.5	21.0	16.5	16.0	16.5
24	25.0	23.0	24.0	27.0	26.0	26.5	21.5	20.5	21.0	16.5	16.0	16.5
25	25.0	22.0	24.0	26.5	25.5	26.0	21.5	20.5	20.5	18.0	16.5	17.0
26	27.5	25.0	26.0	26.0	24.5	25.0	21.5	20.5	21.0	18.0	17.0	17.5
27	27.0	25.5	26.5	25.0	24.0	24.5	23.0	21.5	22.0	18.0	17.0	17.5
28	27.5	26.0	26.5	25.0	23.0	23.5	24.5	22.5	23.5	17.5	17.0	17.0
29	26.5	22.5	24.5	23.5	23.0	23.0	25.0	23.5	24.0	17.5	16.5	16.5
30	26.0	19.5	23.0	24.0	23.0	23.5	25.0	24.5	24.5	16.5	16.0	16.5
31	---	---	---	24.0	23.0	23.5	24.5	24.0	24.0	---	---	---
MONTH	27.5	17.0	23.0	30.0	18.5	26.0	26.0	20.0	23.0	25.0	16.0	19.5

04158500 PIGEON RIVER NEAR OWENDALE, MI

LOCATION.--Lat 43°45'49", long 83°14'46", in SW¼ SE¼ sec.36, T.16 N., R.10 E., Huron County, Hydrologic Unit 04080103, on left bank 600 ft (183 m) downstream from bridge on Kilmanagh Road, 2.5 mi (4.0 km) downstream from confluence of East and West Branches, and 2.5 mi (4.0 km) northeast of Owendale.

DRAINAGE AREA.--55 mi² (140 km²), approximately.

PERIOD OF RECORD.--October 1952 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 645 ft (197 m) from topographic map. Prior to June 10, 1954, nonrecording gage at site 600 ft (183 m) upstream at same datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 31.4 ft³/s (0.889 m³/s), 7.75 in/yr (197 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,550 ft³/s (72.2 m³/s) Mar. 25, 1954, gage height, 10.75 ft (3.277 m), from rating curve extended above 1,200 ft³/s (34.0 m³/s), site and datum then in use; minimum, 0.1 ft³/s (0.003 m³/s) July 31, Aug. 1, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 430 ft³/s (12.1 m³/s) Mar. 5, gage height, 8.40 ft (2.560 m), backwater from ice, no peak above base of 500 ft³/s (14.2 m³/s); minimum, 0.36 ft³/s (0.010 m³/s) July 16, gage height, 2.68 ft (0.817 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.5	4.1	2.7	2.3	1.7	40	46	13	4.3	1.7	1.8	9.8
2	2.5	3.7	2.5	2.3	1.7	22	43	13	5.2	1.4	1.6	16
3	2.2	3.6	2.1	2.3	1.7	17	148	12	4.7	1.1	1.6	21
4	2.1	3.5	2.3	2.3	1.7	78	95	12	4.1	.93	1.8	18
5	2.2	3.5	2.7	2.3	1.7	310	107	13	3.6	1.5	3.1	14
6	5.4	3.4	2.8	2.3	1.7	300	94	12	4.5	3.2	4.6	11
7	9.0	3.3	2.8	2.2	1.7	160	56	11	5.8	2.6	4.5	9.1
8	5.9	3.2	2.7	2.2	1.7	130	44	10	5.2	3.2	11	7.7
9	4.2	3.1	2.7	2.2	1.7	190	37	9.7	4.5	2.4	19	6.4
10	3.5	3.3	2.9	2.2	1.8	245	33	9.3	4.1	1.9	17	5.0
11	3.4	3.0	2.9	2.2	1.9	120	31	8.8	3.8	1.5	19	4.4
12	3.1	3.2	2.7	2.2	2.2	86	26	8.5	3.8	1.4	15	4.1
13	3.1	3.2	2.7	2.2	2.8	102	23	8.7	3.7	1.2	8.8	4.0
14	3.0	3.1	2.7	2.2	3.6	93	21	8.5	3.4	.93	5.9	4.2
15	2.8	3.0	2.9	2.2	4.5	64	18	7.9	3.0	.67	4.2	4.0
16	2.8	3.1	3.1	2.2	3.7	55	17	7.4	2.9	.40	8.6	4.4
17	2.8	3.1	3.1	2.2	3.4	44	16	6.9	2.4	.83	70	10
18	2.9	3.2	3.1	2.2	3.3	39	19	6.4	2.9	.99	71	23
19	3.4	3.3	3.1	2.2	3.2	33	22	6.1	3.0	4.8	34	55
20	3.4	3.2	3.3	2.2	3.1	34	26	5.7	3.7	18	21	132
21	3.5	3.2	3.0	2.2	3.1	33	44	5.2	3.0	6.9	15	94
22	3.2	2.9	2.9	2.2	3.2	34	49	4.4	2.4	3.2	15	57
23	3.1	2.9	2.9	2.2	3.2	32	44	4.4	1.9	2.2	17	43
24	3.2	3.0	2.7	2.2	10	27	36	5.5	1.3	1.6	15	36
25	3.4	3.0	2.8	2.3	200	25	30	16	1.1	1.6	12	40
26	3.4	3.6	2.8	2.6	105	22	25	9.2	1.8	1.4	10	71
27	3.4	5.5	2.8	2.1	76	22	21	6.3	1.8	1.2	8.1	237
28	3.4	6.9	2.8	2.0	58	30	18	4.8	1.4	.99	6.3	109
29	3.3	3.9	2.6	2.0	---	75	15	4.3	1.3	1.0	9.3	58
30	3.4	3.3	2.4	1.9	---	87	14	4.1	1.7	1.3	12	44
31	3.9	---	2.1	1.7	---	57	---	3.9	---	1.7	9.6	---
TOTAL	107.4	104.3	85.6	68.0	507.3	2606	1218	258.0	96.3	73.74	452.8	1152.1
MEAN	3.46	3.48	2.76	2.19	18.1	84.1	40.6	8.32	3.21	2.38	14.6	38.4
MAX	9.0	6.9	3.3	2.6	200	310	148	16	5.8	18	71	237
MIN	2.1	2.9	2.1	1.7	1.7	17	14	3.9	1.1	.40	1.6	4.0
CFSM	.06	.06	.05	.04	.33	1.53	.74	.15	.06	.04	.27	.70
IN.	.07	.07	.06	.05	.34	1.76	.82	.17	.07	.05	.31	.78

CAL YR 1976 TOTAL 21687.70 MEAN 59.3 MAX 900 MIN 1.1 CFSM 1.08 IN 14.67
WTR YR 1977 TOTAL 6729.54 MEAN 18.4 MAX 310 MIN .40 CFSM .34 IN 4.55

04159500 BLACK RIVER NEAR FARGO, MI

LOCATION.--Lat 43°05'32", long 82°37'05", in NW¼ sec.32, T.8 N., R.16 E., St. Clair County, Hydrologic Unit 04090001, on left bank 20 ft (6 m) downstream from bridge on Norman Road, 2.1 mi (3.4 km) east of Fargo, 5.3 mi (8.5 km) upstream from Mill Creek, and 12 mi (19 km) northwest of Port Huron.

DRAINAGE AREA.--480 mi² (1,243 km²).

PERIOD OF RECORD.--February 1944 to current year.

REVISED RECORDS.--WSP 1307: 1950(M). WSP 1627: 1956-58. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 613.75 ft (187.071 m) above mean sea level (levels by Michigan Department of Natural Resources). Prior to July 9, 1954, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--33 years, 277 ft³/s (7.845 m³/s), 7.84 in/yr (199 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,400 ft³/s (408 m³/s) Apr. 5, 1947, gage height, 16.06 ft (4.895 m), from flood-mark, from rating curve extended above 9,500 ft³/s (269 m³/s); maximum gage height observed, 18.05 ft (5.502 m) Feb. 20, 1951 (backwater from ice); minimum discharge observed, 1.8 ft³/s (0.051 m³/s) Sept. 18, 19, 1946.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,850 ft³/s (52.4 m³/s) Mar. 10, gage height, 7.25 ft (2,210 m); maximum gage height, 7.82 ft (2.384 m) Mar. 10, backwater from ice; no peak discharge above base of 3,500 ft³/s (99.1 m³/s); minimum, 7.0 ft³/s (0.20 m³/s) Sept. 12, 13, gage height, 1.64 ft (0.500 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	28	21	15	15	349	397	69	32	23	13	19
2	19	26	20	15	15	272	325	64	29	16	16	23
3	19	27	19	15	15	225	484	60	30	13	19	19
4	22	27	18	15	15	267	466	60	31	16	20	19
5	23	28	17	15	15	1120	628	59	33	18	21	28
6	31	26	17	15	15	1560	936	56	36	23	16	28
7	39	25	16	15	15	1000	548	55	37	23	11	26
8	43	25	16	15	15	624	348	51	34	29	13	23
9	51	24	16	15	15	828	270	48	40	29	27	22
10	44	23	16	15	15	1530	220	45	38	28	34	14
11	37	22	15	15	15	1580	194	45	33	28	35	13
12	30	22	15	15	16	1370	176	44	31	28	33	8.0
13	27	22	15	15	16	1620	150	43	29	33	31	16
14	23	22	15	15	16	1680	136	43	26	33	26	21
15	20	21	15	15	17	944	123	42	25	23	29	21
16	19	20	15	15	17	588	112	41	24	18	25	24
17	19	19	15	15	18	442	106	41	18	17	23	22
18	19	19	15	15	18	322	103	44	19	16	23	48
19	19	19	15	15	19	242	103	44	19	16	21	119
20	20	19	15	15	20	220	107	40	19	11	29	290
21	21	20	15	15	20	245	104	38	19	11	24	437
22	21	21	15	15	22	280	104	35	26	16	30	282
23	22	20	15	15	23	295	146	33	25	15	29	172
24	23	23	15	15	35	275	180	37	24	14	25	127
25	23	21	15	15	200	222	143	34	18	19	23	160
26	22	23	15	15	540	187	119	30	15	19	21	287
27	24	28	15	15	500	164	103	29	20	18	14	385
28	24	28	15	15	400	310	90	24	23	16	16	345
29	23	25	15	15	---	948	80	19	28	17	19	212
30	23	23	15	15	---	1120	75	21	24	13	19	150
31	31	---	15	15	---	636	---	24	---	8.5	17	---
TOTAL	799	696	491	465	2062	21465	7076	1318	805	607.5	702	3360.0
MEAN	25.8	23.2	15.8	15.0	73.6	692	236	42.5	26.8	19.6	22.6	112
MAX	51	28	21	15	540	1680	936	69	40	33	35	437
MIN	18	19	15	15	15	164	75	19	15	8.5	11	8.0
CFSM	.05	.05	.03	.03	.15	1.44	.49	.09	.06	.04	.05	.23
IN.	.06	.05	.04	.04	.16	1.66	.55	.10	.06	.05	.05	.26

CAL YR 1976 TOTAL 162473.0 MEAN 444 MAX 7740 MIN 15 CFSM .93 IN 12.59
WTR YR 1977 TOTAL 39846.5 MEAN 109 MAX 1680 MIN 8.0 CFSM .23 IN 3.09

04160570 NORTH BRANCH BELLE RIVER AT IMLAY CITY, MI

LOCATION.--Lat 43°01'49", long 83°04'02", in SW¼ NW¼ sec.16, T.7 N., R.12 E., Lapeer County, Hydrologic Unit 04090001, on left bank 12 ft (4 m) upstream from bridge on State Highway 21, and 0.6 mi (1.0 km) northeast of Imlay City.

DRAINAGE AREA.--18.0 mi² (46.6 km²).

PERIOD OF RECORD.--August 1965 to current year.

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 800 ft (244 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Some diversion by pumping for sprinkler irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--12 years, 11.5 ft³/s (0.326 m³/s), 8.68 in/yr (220 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 334 ft³/s (9.46 m³/s) Apr. 19, 1975, gage height, 9.33 ft (2.844 m); no flow for part of each day June 27 and 28, 1977, caused by irrigation pumpage; minimum gage height, 2.27 ft (0.692 m) June 27, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 57 ft³/s (1.61 m³/s) Sept. 26, gage height, 4.67 ft (1.423 m); maximum gage height, 6.38 ft (1.945 m) Mar. 5, backwater from ice; no peak discharge above base of 60 ft³/s (1.70 m³/s); no flow for part of each day June 27 and 28, caused by irrigation pumpage.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.7	5.9	3.0	2.7	2.6	9.0	14	5.4	1.8	2.8	1.7	1.2
2	2.5	5.2	2.8	2.7	2.6	9.0	21	5.3	1.7	1.9	1.2	1.8
3	2.4	4.9	2.7	2.7	2.6	10	37	4.8	1.4	1.5	2.1	1.4
4	2.4	4.5	2.7	2.7	2.7	22	23	4.8	1.2	1.3	1.9	1.2
5	2.3	4.3	2.7	2.7	2.7	40	35	5.2	1.2	2.0	3.0	1.1
6	7.8	4.2	2.7	2.7	2.7	35	22	4.7	4.8	1.6	3.3	1.1
7	11	4.0	2.7	2.7	2.7	30	14	4.0	3.6	1.3	2.9	1.0
8	6.6	3.8	2.7	2.7	2.7	25	12	3.7	2.7	2.9	2.4	.95
9	5.5	3.7	2.7	2.7	2.7	30	9.6	3.4	2.7	7.3	2.6	.92
10	4.9	4.0	2.7	2.7	2.7	33	8.8	3.2	2.1	3.4	4.5	.85
11	4.0	3.8	2.7	2.7	2.7	33	8.1	3.0	1.9	2.4	4.2	.74
12	4.2	3.5	2.7	2.6	2.7	29	7.2	2.9	2.1	2.1	3.6	.61
13	3.1	3.5	2.7	2.6	2.8	39	6.9	2.8	2.2	1.6	2.8	2.1
14	4.5	3.6	2.7	2.6	2.8	26	6.3	2.5	1.6	1.3	2.2	3.4
15	3.3	3.3	2.7	2.6	3.0	19	5.8	2.3	1.3	1.3	1.8	2.2
16	2.7	3.2	2.7	2.6	3.1	17	5.8	2.1	1.3	1.6	1.7	3.1
17	3.1	3.4	2.7	2.6	3.2	14	5.7	1.9	1.6	1.3	1.6	3.0
18	3.4	3.6	2.7	2.6	3.2	15	5.4	2.1	3.8	1.3	1.3	7.1
19	3.1	3.7	2.7	2.6	3.4	13	5.4	1.9	2.6	1.6	1.2	10
20	4.3	3.6	2.7	2.6	3.5	12	5.6	1.8	1.8	1.1	1.1	6.3
21	4.8	3.5	2.7	2.6	3.8	11	5.3	1.6	1.4	.99	1.3	4.7
22	4.6	3.3	2.7	2.6	4.0	14	6.4	1.5	1.1	.86	1.7	4.0
23	4.2	3.6	2.7	2.6	5.0	12	15	1.8	.78	.74	1.3	3.6
24	4.4	3.5	2.7	2.6	10	11	13	3.4	.95	.74	1.3	7.3
25	4.8	3.5	2.7	2.6	20	8.2	12	2.2	.84	.84	1.1	14
26	4.6	4.7	2.7	2.6	17	7.6	9.9	1.6	.96	.66	.97	45
27	4.3	8.5	2.7	2.6	13	8.0	8.1	1.3	.68	.61	.93	32
28	4.0	6.9	2.7	2.6	10	20	7.0	1.2	.68	.54	.84	17
29	3.8	5.0	2.7	2.6	---	40	6.0	1.0	6.6	.93	.86	8.7
30	4.0	4.0	2.7	2.6	---	26	5.7	.94	2.9	1.1	.92	7.1
31	6.5	---	2.7	2.6	---	20	---	1.3	---	1.9	.84	---
TOTAL	133.8	126.2	84.1	81.7	139.9	637.8	347.0	85.64	60.29	51.51	59.16	193.47
MEAN	4.32	4.21	2.71	2.64	5.00	20.6	11.6	2.76	2.01	1.66	1.91	6.45
MAX	11	8.5	3.0	2.7	20	40	37	5.4	6.6	7.3	4.5	45
MIN	2.3	3.2	2.7	2.6	2.6	7.6	5.3	.94	.68	.54	.84	.61
CFSM	.24	.23	.15	.15	.28	1.14	.64	.15	.11	.09	.11	.36
IN.	.28	.26	.17	.17	.29	1.32	.72	.18	.12	.11	.12	.40

CAL YR 1976	TOTAL	5011.39	MEAN	13.7	MAX	166	MIN	.51	CFSM	.76	IN	10.36
WTR YR 1977	TOTAL	2000.57	MEAN	5.48	MAX	45	MIN	.54	CFSM	.30	IN	4.13

04160600 BELLE RIVER AT MEMPHIS, MI

LOCATION.--Lat 42°54'03", long 82°46'09", in NW¼ SE¼ sec.35, T.6 N., R.14 E., St. Clair County, Hydrologic Unit 04090001, on right bank, at downstream side of bridge on State Highway 19 at Memphis.

DRAINAGE AREA.--151 mi² (391 km²).

PERIOD OF RECORD.--October 1962 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 720 ft (219 m) from topographic map (nearest 5 ft).

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--15 years, 85.4 ft³/s (2.419 m³/s), 7.68 in/yr (195 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,520 ft³/s (128 m³/s) Apr. 19, 1975, gage height, 8.96 ft (2.731 m); minimum, 3.1 ft³/s (0.088 m³/s) Mar. 10, 1964, gage height, 1.19 ft (0.363 m).

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1947, reached a stage of about 9 ft (2.7 m), from information by local residents.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 435 ft³/s (12.3 m³/s) Mar. 6, gage height, 3.94 ft (1.201 m), no peak above base of 600 ft³/s (17.0 m³/s); minimum, 4.3 ft³/s (0.12 m³/s) July 26, 28, 29, gage height, 1.25 ft (0.381 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	21	14	11	10	77	136	35	10	8.8	6.3	6.2
2	10	23	12	11	10	68	112	34	11	11	7.7	7.4
3	12	21	11	11	10	52	196	35	12	9.1	7.7	9.2
4	9.0	19	11	11	11	166	236	35	11	9.3	7.4	8.1
5	9.4	18	11	11	11	308	246	35	11	8.5	9.2	7.6
6	16	17	11	11	11	369	297	37	11	7.6	8.8	6.9
7	19	16	11	11	11	257	174	35	12	6.6	9.6	6.9
8	30	16	11	11	11	197	114	30	16	6.9	10	6.2
9	23	14	11	11	11	198	87	27	14	9.4	9.3	5.8
10	18	14	11	11	11	276	68	25	13	11	8.7	5.5
11	16	16	11	11	11	283	58	24	12	18	8.9	5.3
12	15	16	11	10	11	222	53	23	11	16	11	5.0
13	14	16	11	10	11	288	45	20	12	13	11	7.0
14	13	16	11	10	11	301	40	20	12	11	8.9	7.6
15	12	15	11	10	12	207	37	19	9.1	10	7.8	9.9
16	13	14	11	10	13	138	35	18	8.5	13	7.0	13
17	12	15	11	10	13	98	33	18	7.8	11	6.4	12
18	12	16	11	10	13	79	32	18	8.9	10	6.0	16
19	11	16	11	10	14	69	30	16	8.2	9.8	5.8	16
20	13	16	11	10	14	69	30	15	10	8.4	5.3	20
21	14	17	11	10	14	79	29	14	10	7.9	5.0	21
22	17	16	11	10	15	93	30	13	7.8	7.2	5.7	17
23	18	16	11	10	20	110	82	12	6.7	6.2	6.4	16
24	18	15	11	10	100	93	152	12	5.7	5.5	7.2	15
25	17	18	11	10	165	73	128	12	5.5	6.1	6.4	14
26	16	18	11	10	165	61	93	12	5.8	4.5	5.7	21
27	17	22	11	10	134	57	71	12	6.2	5.0	5.6	37
28	16	27	11	10	103	115	53	11	14	4.8	5.6	50
29	16	31	11	10	---	345	43	11	9.9	5.2	5.5	35
30	16	17	11	10	---	367	38	9.4	6.9	6.1	5.4	27
31	21	---	11	10	---	211	---	9.8	---	5.8	5.3	---
TOTAL	474.4	532	345	321	946	5326	2778	647.2	299.0	272.7	226.6	434.6
MEAN	15.3	17.7	11.1	10.4	33.8	172	92.6	20.9	9.97	8.80	7.31	14.5
MAX	30	31	14	11	165	369	297	37	16	18	11	50
MIN	9.0	14	11	10	10	52	29	9.4	5.5	4.5	5.8	5.0
CFSM	.10	.12	.07	.07	.22	1.14	.61	.14	.07	.06	.05	.10
IN.	.12	.13	.08	.08	.23	1.31	.68	.16	.07	.07	.06	.11

CAL YR 1976 TOTAL 43442.7 MEAN 119 MAX 1690 MIN 5.5 CFSM .79 IN 10.70
WTR YR 1977 TOTAL 12602.5 MEAN 34.5 MAX 369 MIN 4.5 CFSM .23 IN 3.10

04160800 SASHABAW CREEK NEAR DRAYTON PLAINS, MI

LOCATION.--Lat 42°43'12", long 83°21'13", in SE¼ sec.26, T.4 N., R.9 E., Oakland County, Hydrologic Unit 04090003, on right bank 25 ft (8 m) upstream from bridge on Maybee Road, 1.1 mi (1.8 km) upstream from mouth, and 2.5 mi (4.0 km) northeast of Drayton Plains.

DRAINAGE AREA.--20.9 mi² (54.1 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Metal V-notch weir Aug. 30, 1961, to Mar. 6, 1968. Altitude of gage is 970 ft (296 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 12.2 ft³/s (0.346 m³/s), 7.93 in/yr (201 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 161 ft³/s (4.56 m³/s) Feb. 23, 1974, gage height, 4.38 ft (1.335 m); minimum, 0.2 ft³/s (0.006 m³/s) on many days during 1961, 1963, 1964, 1965, 1966; minimum gage height, 1.59 ft (0.485 m) Aug. 1, 2, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 44 ft³/s (1.25 m³/s) Mar. 29, gage height, 3.19 ft (0.972 m), no peak above base of 45 ft³/s (1.27 m³/s); minimum, 0.25 ft³/s (0.007 m³/s) Sept. 10, 11, 12; minimum gage height, 1.74 ft (0.530 m) July 27, 28, 29, Sept. 10, 11, 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.1	5.5	4.5	3.8	3.3	8.9	25	16	3.8	4.3	.89	.55
2	2.1	5.2	4.2	3.8	3.3	9.0	26	15	3.8	2.3	.71	1.2
3	2.0	5.0	4.0	3.8	3.3	9.9	29	14	3.8	1.8	2.0	.79
4	2.0	4.7	3.8	3.8	3.3	18	25	14	3.4	1.8	2.3	.71
5	1.8	4.7	3.7	3.8	3.3	24	29	15	3.4	2.1	1.8	.71
6	6.9	4.5	3.6	3.7	3.3	19	25	13	5.7	1.8	1.8	.63
7	9.7	4.3	3.5	3.7	3.3	17	22	12	6.7	1.6	2.0	.55
8	6.4	3.8	3.5	3.7	3.3	20	20	11	5.7	1.7	1.8	.48
9	5.2	3.6	3.5	3.7	3.3	27	18	10	5.7	2.5	1.3	.41
10	4.5	3.6	3.5	3.7	3.3	31	17	10	4.7	1.8	1.2	.30
11	4.1	3.2	3.5	3.6	3.4	30	16	9.9	4.3	1.7	1.2	.25
12	3.8	3.0	3.6	3.6	3.4	31	14	9.4	5.0	2.0	1.3	.25
13	3.6	3.0	3.6	3.6	3.4	34	13	8.9	5.0	1.7	1.1	1.4
14	3.4	3.2	3.7	3.6	3.4	30	13	8.4	4.3	1.4	.89	1.6
15	3.2	3.0	4.0	3.6	3.4	26	11	7.7	4.1	1.3	.71	1.3
16	2.7	2.7	4.1	3.6	3.5	23	11	7.4	3.6	1.3	.79	2.5
17	2.5	3.0	3.8	3.6	3.5	20	11	7.4	4.1	1.3	.89	2.1
18	2.5	4.1	3.4	3.5	3.5	20	11	8.4	18	1.4	.71	3.0
19	2.7	3.8	3.4	3.5	3.5	19	10	7.9	11	1.7	.71	3.2
20	4.1	3.8	4.0	3.5	3.5	19	10	6.9	6.7	1.2	.63	2.5
21	4.3	3.6	4.0	3.5	3.5	17	11	6.4	4.7	.99	.71	2.0
22	4.1	3.6	4.0	3.5	3.5	18	13	6.4	3.6	.79	.79	1.8
23	3.6	3.4	4.0	3.5	4.5	17	30	6.2	3.0	.71	.55	1.7
24	3.6	3.0	4.0	3.5	6.0	16	31	5.7	2.5	.71	.79	2.0
25	3.8	3.4	4.0	3.5	11	15	35	5.5	2.1	.99	.71	2.3
26	3.6	5.9	4.0	3.5	10	14	32	5.0	1.7	.63	.71	7.7
27	3.2	12	4.0	3.5	9.3	15	26	4.5	1.6	.55	.71	5.7
28	3.2	9.4	4.0	3.5	9.0	31	23	4.1	1.4	.48	.55	4.3
29	3.2	7.0	4.0	3.4	---	41	20	3.8	2.3	.79	.63	3.6
30	3.4	5.0	4.0	3.4	---	33	18	3.6	2.7	1.2	.71	3.4
31	6.4	---	4.0	3.4	---	29	---	3.6	---	1.1	.55	---
TOTAL	117.7	134.0	118.9	111.4	124.3	681.8	595	267.1	138.4	45.64	32.14	58.93
MEAN	3.80	4.47	3.84	3.59	4.44	22.0	19.8	8.62	4.61	1.47	1.04	1.96
MAX	9.7	12	4.5	3.8	11	41	35	16	18	4.3	2.3	7.7
MIN	1.8	2.7	3.4	3.4	3.3	8.9	10	3.6	1.4	.48	.55	.25
CFSM	.18	.21	.18	.17	.21	1.05	.95	.41	.22	.07	.05	.09
IN.	.21	.24	.21	.20	.22	1.21	1.06	.48	.25	.08	.06	.10

CAL YR 1976 TOTAL 6656.30 MEAN 18.2 MAX 96 MIN 1.1 CFSM .87 IN 11.85
WTR YR 1977 TOTAL 2425.31 MEAN 6.64 MAX 41 MIN .25 CFSM .32 IN 4.32

04160900 CLINTON RIVER NEAR DRAYTON PLAINS, MI

LOCATION.--Lat 42°39'37", long 83°23'25", in NE¼ sec.21, T.3 N., R.9 E., Oakland County, Hydrologic Unit 04090003, on left bank 14 ft (4 m) downstream from bridge on State Highway 59, 1.0 mi (1.6 km) downstream from State fish hatchery, and 2.0 mi (3.2 km) south of Drayton Plains.

DRAINAGE AREA.--79.2 mi² (205.1 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 940 ft (287 m) from topographic map (nearest 10 ft). Jan. 29 to July 9, 1964, non-recording gage at same site and datum.

REMARKS.--Records good. Some regulation and occasional diversion for lake level control at many lakes above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 51.4 ft³/s (1.456 m³/s), 8.81 in/yr (224 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 276 ft³/s (7.82 m³/s) Mar. 12, 1974, gage height, 4.95 ft (1.509 m); minimum, 2.4 ft³/s (0.068 m³/s) May 31, 1961; minimum gage height, 1.23 ft (0.375 m) Jan. 4, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 108 ft³/s (3.06 m³/s) Apr. 2, gage height, 3.51 ft (1.070 m); minimum, 4.6 ft³/s (0.13 m³/s) Sept. 15, gage height, 1.89 ft (0.576 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	27	35	41	31	29	36	90	64	15	21	11	5.9
2	28	36	40	31	28	36	98	56	14	20	12	6.2
3	27	37	41	31	28	36	97	38	14	19	9.4	5.3
4	28	39	40	30	28	43	98	42	14	19	8.5	6.0
5	33	38	39	30	28	42	95	46	13	18	9.1	6.1
6	40	38	38	30	28	41	92	46	14	28	9.1	5.9
7	40	38	38	30	28	42	90	46	12	39	8.9	5.5
8	42	39	38	30	28	45	87	44	12	14	12	5.6
9	40	41	37	30	28	49	83	40	12	17	12	5.6
10	38	44	36	30	28	52	80	35	12	15	8.6	5.3
11	37	48	36	31	28	55	76	32	13	15	7.0	5.2
12	35	51	35	31	28	62	74	29	17	23	5.5	5.4
13	33	52	36	31	29	68	71	29	25	26	5.6	8.1
14	35	51	34	31	29	71	67	29	12	11	5.6	5.7
15	40	51	33	31	29	74	59	28	12	13	5.4	5.8
16	38	50	33	30	30	74	55	26	13	12	5.8	5.9
17	38	48	33	30	29	72	53	24	16	12	5.6	5.0
18	38	45	32	30	28	70	48	24	21	15	5.4	7.0
19	38	43	32	30	28	68	43	21	28	13	5.2	6.6
20	41	41	33	30	28	66	36	21	37	11	5.2	6.3
21	46	39	33	29	28	66	36	21	25	11	6.5	6.2
22	48	38	32	29	29	65	40	21	25	11	6.6	12
23	46	38	32	29	29	63	50	18	24	11	6.5	17
24	45	38	33	28	35	64	53	18	20	11	6.6	18
25	43	38	32	28	35	67	65	21	24	10	5.7	17
26	39	40	32	28	35	66	69	17	27	9.9	5.6	30
27	39	46	32	31	36	65	69	17	30	11	6.2	37
28	37	43	32	29	37	79	79	17	29	7.9	5.9	39
29	37	42	32	30	---	80	74	23	23	8.7	6.5	44
30	37	41	32	29	---	82	65	20	22	9.3	5.8	46
31	37	---	31	29	---	85	---	18	---	9.3	5.4	---
TOTAL	1170	1268	1078	927	831	1884	2092	931	575	471.1	224.2	384.6
MEAN	37.7	42.3	34.8	29.9	29.7	60.8	69.7	30.0	19.2	15.2	7.23	12.8
MAX	48	52	41	31	37	85	98	64	37	39	12	46
MIN	27	35	31	28	28	36	36	17	12	7.9	5.2	5.0
CFSM	.48	.53	.44	.38	.38	.77	.88	.38	.24	.19	.09	.16
IN.	.55	.60	.51	.44	.39	.88	.98	.44	.27	.22	.11	.18

CAL YR 1976 TOTAL 25867.0 MEAN 70.7 MAX 221 MIN 16 CFSM .89 IN 12.15
WTR YR 1977 TOTAL 11835.9 MEAN 32.4 MAX 98 MIN 5.0 CFSM .41 IN 5.56

04161000 CLINTON RIVER AT AUBURN HEIGHTS, MI

LOCATION.--Lat 42°38'00", long 83°13'28", in NW¼ sec.36, T.3 N., R.10 E., Oakland County, Hydrologic Unit 04090003, on right bank 30 ft (9 m) upstream from bridge on Auburn Road at Auburn Heights, and 2.8 mi (4.5 km) upstream from Galloway Creek.

DRAINAGE AREA.--123 mi² (319 km²).

PERIOD OF RECORD.--May 1935 to June 1939 and February to September 1940 (published as "at Pontiac"), October 1956 to current year.

REVISED RECORDS.--WSP 1307: 1937(M). WSP 1507: Drainage area at former site.

GAGE.--Water-stage recorder. Datum of gage is 846.50 ft (258.013 m) above mean sea level. Prior to October 1940, nonrecording gage at site 3.3 mi (5.3 km) upstream at datum 876.01 ft (267.008 m) above mean sea level.

REMARKS.--Records good. Some regulation by many lakes above station. Flow includes waste from city of Pontiac water supply, most of which is obtained from sources outside the basin. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years (water years 1936-38, 1957-77), 101 ft³/s (2.860 m³/s), 11.1% in/yr (283 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,720 ft³/s (48.7 m³/s) Apr. 19, 1975, gage height, 5.37 ft (1.637 m); minimum observed, 4.8 ft³/s (0.14 m³/s) Sept. 4, 1936, site then in use.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 460 ft³/s (13.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 4	1800	490	13.9	3.04	0.927	Apr. 4	2400	494	14.0	3.03	0.924
Mar. 28	1700	506	14.3	3.07	0.936	July 8	2400	675	19.1	3.47	1.058
Apr. 2	1930	*805	22.8	*3.71	1.131						

Minimum discharge, 29 ft³/s (0.82 m³/s) May 20, Sept. 5, 6; minimum gage height, 0.97 ft (0.296 m) May 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	48	116	86	129	134	89	204	127	51	60	38	39
2	94	114	84	156	92	96	337	123	42	46	39	55
3	58	112	86	73	112	97	264	120	42	40	55	39
4	88	104	94	44	93	271	253	107	41	39	47	34
5	126	112	87	43	68	174	279	85	39	50	52	32
6	284	92	86	43	61	133	218	87	90	48	51	34
7	188	82	90	78	63	110	211	85	50	104	43	36
8	175	80	87	76	72	114	207	80	43	183	42	36
9	171	82	86	74	75	166	197	78	42	187	39	39
10	152	82	90	73	82	183	185	83	44	114	44	36
11	145	82	84	75	93	169	188	80	43	127	45	36
12	120	82	78	72	92	201	188	73	50	103	46	42
13	93	94	93	70	92	174	166	59	42	70	41	96
14	93	100	97	69	80	125	134	45	44	86	37	47
15	102	104	89	69	82	143	134	41	43	86	38	59
16	100	89	84	63	77	169	133	40	45	80	39	59
17	109	79	87	87	78	150	132	46	87	61	38	42
18	86	77	89	86	81	145	153	75	122	86	37	88
19	107	74	87	48	84	174	137	46	54	66	38	71
20	97	73	106	42	77	160	131	45	46	53	38	48
21	88	70	91	42	75	158	138	46	75	47	36	39
22	76	71	89	41	90	163	168	53	79	45	37	38
23	88	75	92	39	105	112	260	48	92	42	38	40
24	72	74	87	168	226	143	167	44	92	38	46	53
25	81	67	78	103	119	160	234	44	94	49	39	42
26	87	106	78	42	105	167	178	43	90	41	40	83
27	80	157	78	44	102	166	156	44	90	40	37	101
28	76	89	78	49	96	341	139	40	81	39	35	147
29	104	79	77	49	---	255	137	37	90	45	49	143
30	146	84	73	50	---	216	134	38	73	42	40	133
31	144	---	48	96	---	213	---	41	---	39	39	---
TOTAL	3438	2702	2639	2193	2610	5137	5562	2003	1916	2156	1283	1787
MEAN	111	90.1	85.1	70.7	93.2	166	185	64.6	63.9	69.5	41.4	59.6
MAX	284	157	106	168	226	341	337	127	122	187	55	147
MIN	48	67	48	39	61	89	131	37	39	38	35	32

CAL YR 1976 TOTAL 55513 MEAN 152 MAX 512 MIN 35
WTR YR 1977 TOTAL 33426 MEAN 91.6 MAX 341 MIN 32

04161100 GALLOWAY CREEK NEAR AUBURN HEIGHTS, MI

LOCATION.--Lat 42°40'02", long 83°12'02", in SE¼ sec.18, T.3 N., R.11 E., Oakland County, Hydrologic Unit 04090003, on right bank 12 ft (4 m) downstream from wooden bridge on Oakland University property, and 2.7 mi (4.3 km) northeast of Auburn Heights.

DRAINAGE AREA.--17.9 mi² (46.4 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Concrete control since Aug. 20, 1960. Datum of gage is 820.78 ft (250.174 m) above mean sea level (levels by Johnson and Anderson, Inc.).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 9.76 ft³/s (0.276 m³/s), 7.40 in/yr (188 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 368 ft³/s (10.4 m³/s) June 25, 1968, gage height, 6.27 ft (1.911 m); minimum, 0.01 ft³/s (<0.001 m³/s) on several days during July and August, 1964; minimum gage height, 0.82 ft (0.250 m) Aug. 1, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 84.0 ft³/s (2.38 m³/s) Mar. 29, gage height, 4.54 ft (1.384 m), no peak above base of 90.0 ft³/s (2.55 m³/s); minimum, 0.69 ft³/s (0.020 m³/s) Aug. 28, gage height, 1.71 ft (0.521 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.8	4.5	3.8	1.9	1.6	13	27	13	2.9	3.5	1.1	.96
2	1.6	4.0	3.3	1.9	1.6	12	39	12	2.6	1.8	1.1	1.5
3	1.5	3.7	2.8	1.8	1.6	11	57	11	2.5	1.4	1.9	1.1
4	1.4	3.4	2.6	1.8	1.6	41	40	10	2.3	1.4	2.5	1.1
5	1.4	3.2	2.4	1.8	1.6	58	64	10	2.5	1.8	1.8	1.1
6	12	3.0	2.3	1.8	1.6	38	44	9.0	5.4	1.2	1.4	1.1
7	10	2.8	2.2	1.8	1.6	25	29	8.0	4.3	1.2	1.5	1.1
8	7.2	2.7	2.2	1.8	1.6	24	23	7.5	3.6	1.9	1.3	1.1
9	5.2	2.5	2.1	1.8	1.6	30	19	6.7	3.2	11	1.2	.96
10	4.0	2.5	2.1	1.8	1.7	32	19	6.0	2.8	4.6	1.3	.96
11	3.2	2.4	2.1	1.8	1.9	29	15	5.5	2.6	3.7	1.1	.96
12	2.7	2.3	2.1	1.8	2.0	29	13	5.1	3.0	6.7	1.4	.96
13	2.7	2.2	2.1	1.8	1.9	45	12	4.6	2.9	4.5	1.1	3.6
14	2.5	1.9	2.1	1.8	1.9	32	10	4.3	2.3	3.2	.96	2.1
15	2.4	1.9	2.0	1.7	1.8	25	9.2	3.9	2.1	2.3	.96	1.8
16	2.3	1.9	2.0	1.7	1.7	21	8.3	3.7	1.9	1.9	1.1	3.5
17	1.9	1.7	2.0	1.7	1.7	17	7.8	3.6	2.9	1.8	1.1	1.8
18	2.7	1.9	2.0	1.7	1.7	17	7.6	6.9	8.3	2.3	.96	5.5
19	2.7	2.0	2.0	1.7	1.7	17	7.2	5.7	5.8	4.2	.96	3.6
20	3.6	1.9	2.0	1.7	1.6	19	7.2	5.1	4.3	2.8	.96	3.2
21	3.4	1.9	2.0	1.7	1.6	19	6.9	4.5	3.3	2.1	1.1	2.6
22	3.2	1.7	2.0	1.7	1.6	21	8.5	4.3	2.3	1.5	1.2	2.2
23	3.0	1.7	2.0	1.7	2.5	20	37	4.5	1.9	1.1	1.1	2.3
24	3.2	1.7	1.9	1.7	33	18	50	3.9	1.6	1.1	1.2	3.0
25	3.2	1.7	1.9	1.7	31	16	56	3.7	1.5	1.5	1.1	3.2
26	3.2	3.4	1.9	1.7	24	15	52	3.2	1.3	1.1	.96	8.0
27	3.0	15	1.9	1.7	21	15	34	2.8	1.2	1.1	.96	4.8
28	2.7	11	1.9	1.7	16	62	25	2.6	1.3	1.1	.87	4.0
29	2.7	6.5	1.9	1.6	---	79	19	2.6	3.7	1.3	1.1	3.3
30	3.0	4.7	1.9	1.6	---	56	16	2.5	2.8	1.4	1.1	2.9
31	6.2	---	1.9	1.6	---	37	---	2.5	---	1.2	1.1	---
TOTAL	109.6	101.7	67.4	54.0	164.7	893	762.7	178.7	89.1	77.7	37.49	74.30
MEAN	3.54	3.39	2.17	1.74	5.88	28.8	25.4	5.76	2.97	2.51	1.21	2.48
MAX	12	15	3.8	1.9	33	79	64	13	8.3	11	2.5	8.0
MIN	1.4	1.7	1.9	1.6	1.6	11	6.9	2.5	1.2	1.1	.87	.96
CFSM	.20	.19	.12	.10	.33	1.61	1.42	.32	.17	.14	.07	.14
IN.	.23	.21	.14	.11	.34	1.86	1.58	.37	.19	.16	.08	.15

CAL YR 1976 TOTAL 4863.70 MEAN 13.3 MAX 93 MIN 1.4 CFSM .74 IN 10.11
WTR YR 1977 TOTAL 2610.39 MEAN 7.15 MAX 79 MIN .87 CFSM .40 IN 5.42

04161540 PAINT CREEK AT ROCHESTER, MI

LOCATION.--Lat 42°41'18", long 83°08'35", in NW¼ SE¼ sec.10, T.3 N., R.11 E., Oakland County, Hydrologic Unit 04090003, on right bank at upstream side of bridge on Ludlow Street in Rochester, and 1.5 mi (2.4 km) upstream from mouth.

DRAINAGE AREA.--70.9 mi² (183.6 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 755.11 ft (230.158 m) above mean sea level.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by Lake Orion. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 51.3 ft³/s (1.453 m³/s), 9.83 in/yr (250 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 918 ft³/s (26.0 m³/s) Feb. 1, 1968; maximum gage height, 5.95 ft (1.814 m) Feb. 10, 1965 (backwater from ice); minimum discharge, 1.2 ft³/s (0.034 m³/s) Aug. 19, 1974, caused by regulation due to bridge construction; minimum gage height, 1.26 ft (0.384 m) Sept. 16, 1960.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 200 ft³/s (5.66 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 15	1630	ice jam		*3.05	0.930	Apr. 2	1700	*215	6.09	2.96	0.902
Mar. 28	2400	*215	6.09	2.96	0.902						

Minimum natural discharge, 11 ft³/s (0.31 m³/s) Sept. 12; minimum gage height, 1.43 ft (0.436 m) Feb. 16, caused by ice jam upstream.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	58	26	31	26	42	109	45	21	26	13	12
2	25	55	26	31	26	47	131	42	17	16	12	16
3	24	55	26	31	27	42	128	32	17	20	18	15
4	24	52	25	31	28	107	121	32	16	16	17	14
5	24	49	25	31	29	119	151	32	15	22	18	14
6	55	47	25	30	27	80	116	30	25	20	16	13
7	51	51	25	30	26	72	102	32	21	19	17	12
8	41	57	25	30	26	76	93	31	19	22	16	12
9	37	54	25	30	25	93	85	33	20	22	15	13
10	34	50	25	30	26	103	80	30	20	19	17	12
11	33	47	24	30	27	99	76	38	21	23	17	12
12	31	44	28	30	30	111	84	29	25	21	18	12
13	30	42	29	30	33	138	87	24	26	15	17	23
14	29	39	33	30	33	123	78	23	24	12	15	21
15	32	35	32	30	31	127	66	22	22	12	14	19
16	28	33	31	30	30	145	62	21	21	12	15	24
17	27	31	30	30	29	120	58	23	19	13	15	23
18	27	30	30	30	28	93	54	34	27	15	13	31
19	27	28	31	30	27	84	52	29	21	19	13	28
20	31	27	33	30	28	78	51	30	26	15	14	24
21	32	26	33	29	29	72	50	30	24	14	15	23
22	31	25	33	29	30	75	59	29	23	13	15	26
23	29	24	32	29	38	70	115	27	16	12	14	26
24	31	23	32	29	103	66	121	31	21	13	15	27
25	32	22	32	29	77	63	133	28	15	17	13	28
26	32	28	31	28	51	62	120	25	13	18	13	46
27	46	50	31	28	47	64	102	23	12	13	13	36
28	42	38	31	28	45	161	80	20	13	12	13	29
29	41	29	31	28	---	176	61	16	23	14	14	27
30	44	28	31	27	---	131	50	21	23	16	14	27
31	58	---	31	27	---	118	---	21	---	14	13	---
TOTAL	1053	1177	904	916	981	2957	2675	883	606	515	462	645
MEAN	34.0	39.2	29.2	29.5	35.0	95.4	89.2	28.5	20.2	16.6	14.9	21.5
MAX	58	58	33	31	103	176	151	45	27	26	18	46
MIN	24	22	25	27	25	42	50	16	12	12	12	12
CFSM	.48	.55	.41	.42	.49	1.35	1.26	.40	.29	.23	.21	.30
IN.	.55	.62	.47	.48	.51	1.55	1.40	.46	.32	.27	.24	.34

CAL YR 1976 TOTAL 28010 MEAN 76.5 MAX 449 MIN 17 CFSM 1.08 IN 14.70
WTR YR 1977 TOTAL 13774 MEAN 37.7 MAX 176 MIN 12 CFSM .53 IN 7.23

04161580 STONY CREEK NEAR ROMEO, MI

LOCATION.--Lat 42°48'03", long 83°05'25", in SW¼, sec.31, T.5 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank at upstream side of bridge on Romeo Road, and 4.0 mi (6.4 km) west of Romeo.

DRAINAGE AREA.--25.6 mi² (66.3 km²).

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 861.64 ft (262.628 m) above mean sea level.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--13 years, 18.1 ft³/s (0.513 m³/s), 9.60 in/yr (244 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 290 ft³/s (8.21 m³/s) Apr. 19, 1975, gage height, 5.19 ft (1.582 m); minimum, 0.92 ft³/s (0.026 m³/s) Oct. 5, 9, 1967; minimum gage height, 1.28 ft (0.390 m) July 27, 28, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 79 ft³/s (2.24 m³/s) Mar. 4, gage height, 3.27 ft (0.997 m), no peak above base of 100 ft³/s (2.83 m³/s); minimum, 2.4 ft³/s (0.068 m³/s) July 23, 24, 27, 28, Aug. 19, gage height, 1.41 ft (0.430 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.0	17	7.5	9.5	8.0	18	42	11	3.3	4.9	4.2	3.4
2	11	13	7.0	9.5	8.0	17	42	10	3.7	3.5	3.3	4.1
3	10	12	7.0	9.5	8.0	20	45	9.3	3.5	3.1	3.3	3.8
4	5.6	12	7.0	9.5	8.0	43	41	9.5	3.1	3.0	4.1	3.2
5	6.0	11	7.0	9.5	8.0	51	52	10	3.0	4.7	4.1	4.1
6	26	14	7.0	9.5	8.0	34	45	9.4	4.8	3.5	4.0	3.6
7	30	14	7.0	9.5	8.0	32	41	8.1	4.7	3.3	3.7	7.1
8	16	12	7.0	9.5	8.0	35	37	7.2	3.8	3.5	3.5	6.4
9	12	11	6.5	9.5	8.0	46	32	6.9	3.7	6.9	3.3	7.2
10	10	12	6.5	9.5	8.0	54	30	6.5	3.4	4.1	3.7	3.3
11	10	11	6.5	9.5	8.0	50	29	6.2	3.3	3.7	3.8	2.6
12	9.0	10	6.5	9.5	8.0	49	26	5.9	3.5	4.2	3.8	2.6
13	9.0	10	6.7	9.5	8.0	61	24	5.8	3.5	3.9	3.3	5.5
14	9.2	10	7.0	9.5	8.0	50	22	5.5	3.3	3.9	3.0	5.3
15	20	9.7	7.5	9.5	8.0	41	19	5.2	3.0	3.4	2.9	3.9
16	23	9.7	8.5	9.5	8.0	36	19	4.9	2.8	3.2	3.4	6.4
17	22	9.8	9.0	9.5	8.0	26	18	4.6	2.9	3.3	3.2	8.1
18	21	10	9.5	9.5	8.0	34	17	5.9	4.1	3.8	2.8	8.4
19	20	15	10	9.3	8.0	34	16	4.9	3.6	4.3	2.7	10
20	22	8.1	11	9.2	8.0	35	15	4.5	3.1	3.6	2.9	14
21	21	6.2	11	9.2	8.0	32	9.6	4.2	3.0	3.1	2.9	16
22	20	5.6	11	9.2	8.0	28	13	4.0	2.8	2.7	3.1	16
23	19	5.6	11	9.2	8.2	21	38	4.0	2.6	2.5	3.0	14
24	20	5.5	10	9.2	28	32	34	3.9	2.7	2.5	3.1	11
25	19	6.2	10	9.2	26	28	28	3.9	2.7	3.1	2.8	11
26	17	12	10	9.2	24	29	24	3.5	2.6	2.6	2.9	22
27	14	28	10	9.2	23	28	20	3.3	2.6	2.5	2.9	17
28	14	18	10	9.0	20	49	16	3.2	2.7	2.4	2.7	18
29	17	10	10	8.5	---	63	13	3.0	5.1	2.9	2.8	18
30	17	9.0	9.5	8.5	---	56	12	3.0	4.1	3.6	3.0	17
31	23	---	9.5	8.0	---	49	---	3.0	---	3.8	3.0	---
TOTAL	496.8	337.4	263.7	287.9	305.2	1181	819.6	180.3	101.0	109.5	101.2	273.0
MEAN	16.0	11.2	8.51	9.29	10.9	38.1	27.3	5.82	3.37	3.53	3.26	9.10
MAX	30	28	11	9.5	28	63	52	11	5.1	6.9	4.2	22
MIN	4.0	5.5	6.5	8.0	8.0	17	9.6	3.0	2.6	2.4	2.7	2.6
CFSM	.63	.44	.33	.36	.43	1.49	1.07	.23	.13	.14	.13	.36
IN.	.72	.49	.38	.42	.44	1.72	1.19	.26	.15	.16	.15	.40

CAL YR 1976 TOTAL 10007.3 MEAN 27.3 MAX 159 MIN 3.9 CFSM 1.07 IN 14.54
WTR YR 1977 TOTAL 4456.6 MEAN 12.2 MAX 63 MIN 2.4 CFSM .48 IN 6.48

04161790 STONY LAKE NEAR WASHINGTON, MI

LOCATION.--Lat 42°42'58", long 83°05'58", in SE¼ sec.31, T.4 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank 1,000 ft (305 m) east of bridge over dam on Stony Creek, and 2.7 mi (4.3 km) west of Washington.

DRAINAGE AREA.--68.0 mi² (176.1 km²).

PERIOD OF RECORD.--February 1963 to current year.

GAGE.--Water-stage recorder. Datum of gage is 790.00 ft (240.792 m) above mean sea level (levels by Huron-Clinton Metropolitan Authority). Gage readings have been converted to elevations above mean sea level.

REMARKS.--Reservoir is formed by an earthfill dam with concrete spillway completed in 1962. The spillway section includes a drum gate with minimum crest elevation of 796 ft (242.6 m), maximum of 802 ft (244.4 m); and 2 sluices, one on each side, with valve controls capable of draining lake. Total capacity (new capacity table put into use Oct. 1, 1973), 4,649 acre-ft (5.73 hm³) at elevation of 802 ft (244.4 m). The reservoir began filling February 1963. Lake is used for recreational purposes.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 5,495 acre-ft (6.78 hm³) May 17, 18, 1974, Apr. 20, 1975, elevation 803.6 ft (244.94 m); minimum recorded, 1,758 acre-ft (2.17 hm³) Nov. 21, 1967, elevation, 794.7 ft (242.22 m).

EXTREMES FOR CURRENT YEAR.--Maximum contents, 4,805 acre-ft (5.92 hm³) Oct. 7-8, elevation, 802.3 ft (244.54 m); minimum, 3,913 acre-ft (4.82 hm³) Dec. 5 to Feb. 24, elevation, 800.5 ft (243.99 m).

REVISIONS.--The elevation reported for September 30, 1976 in WDR MI-76-1 was incorrect. The figures given below supercede those previously published.

Date	Elevation (feet)	Contents (acre-feet)	Change in contents during month: Acre-feet	Change in contents during month: Equivalent in ft³/s
Sept. 30, 1976	802.1	4701	0	0
WTR YR 1976	--	--	-156	-0.2

MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

Date	Elevation (feet)	Contents (acre-feet)	Change in contents during month: Acre-feet	Change in contents during month: Equivalent in ft³/s
Sept. 30	802.1	4701	--	--
Oct. 31	802.2	4753	+52	+0.8
Nov. 30	800.9	4105	-648	-10.9
Dec. 31	800.5	3913	-192	-3.1
CAL YR 1976	--	--	-144	-0.2
Jan. 31	800.5	3913	0	0
Feb. 28	800.7	4009	+96	+1.7
Mar. 31	801.8	4549	+540	+8.8
Apr. 30	801.5	4399	-150	-2.5
May 31	801.5	4399	0	0
June 30	801.6	4449	+50	+0.8
July 31	801.6	4449	0	0
Aug. 31	801.6	4449	0	0
Sept. 30	801.8	4549	+100	+1.7
WTR YR 1977	--	--	-152	-0.2

04161800 STONY CREEK NEAR WASHINGTON, MI

LOCATION.--Lat 42°42'55", long 83°05'31", in SW¼ sec.31, T.4 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank 15 ft (5 m) downstream from bridge on Mt. Vernon Road, 500 ft (152 m) downstream from Stony Lake Dam, and 2.9 mi (4.7 km) west of Washington.

DRAINAGE AREA.--68.2 mi² (176.6 km²).

PERIOD OF RECORD.--July 1958 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 772.59 ft (235.485 m) above mean sea level (levels by Huron-Clinton Metropolitan Authority).

REMARKS.--Records good. Occasional diurnal fluctuation caused by mills above station prior to February 1963; occasional regulation by Stony Lake since (see sta 04161790). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 41.8 ft³/s (1.184 m³/s), 8.32 in/yr (211 mm/yr), adjusted for storage since 1963.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 427 ft³/s (12.1 m³/s) Feb. 2, 1968, gage height, 5.86 ft (1.786 m); maximum gage height, 6.71 ft (2.045 m) Mar. 6, 1959, backwater from ice; minimum discharge, 0.9 ft³/s (0.025 m³/s) July 10, 1963; minimum gage height, 1.84 ft (0.561 m) July 31, 1964; minimum daily discharge, 1.3 ft³/s (0.037 m³/s) July 31, Aug. 1, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 233 ft³/s (6.60 m³/s) Nov. 15, gage height, 4.91 ft (1.497 m); minimum, 5.7 ft³/s (0.16 m³/s) Aug. 20, 21, gage height, 1.98 ft (0.604 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	42	60	25	21	51	119	49	11	12	9.5	7.4
2	17	40	36	25	21	48	118	48	12	11	8.3	9.2
3	18	37	26	25	22	48	122	42	11	10	8.8	11
4	20	34	22	25	22	67	107	40	11	11	10	7.7
5	21	31	20	25	23	114	122	30	12	15	12	8.5
6	46	28	20	25	22	115	119	14	23	13	12	7.4
7	61	28	23	25	21	98	110	18	16	13	12	6.5
8	54	27	21	25	21	87	99	15	14	16	12	7.4
9	45	26	21	25	20	95	87	14	17	38	11	6.6
10	35	26	21	25	20	109	81	11	12	26	10	7.5
11	31	26	20	26	21	116	74	13	12	20	10	6.7
12	29	26	20	25	23	120	67	16	15	17	10	6.2
13	28	26	20	25	27	143	62	18	14	11	9.5	12
14	25	25	21	25	27	138	58	19	14	11	10	14
15	22	115	25	25	26	131	53	18	13	11	8.4	13
16	21	85	25	25	24	144	49	18	12	11	8.0	16
17	26	50	27	25	23	106	47	19	13	11	8.8	16
18	29	66	29	25	22	95	45	26	17	11	7.0	21
19	31	71	31	25	22	80	44	27	14	15	6.7	25
20	37	46	33	25	23	79	44	25	13	14	6.1	22
21	36	37	34	25	23	51	42	23	12	14	6.1	21
22	34	61	33	25	23	79	48	21	10	12	7.1	21
23	32	53	32	25	24	61	77	20	9.3	7.8	7.1	22
24	37	35	32	24	46	63	101	19	9.1	7.1	8.3	24
25	38	28	30	24	78	59	110	21	10	12	6.1	25
26	38	30	30	25	74	57	97	18	8.9	9.3	6.0	29
27	31	46	31	25	69	62	85	14	8.3	7.4	6.5	31
28	29	51	30	25	58	68	79	14	8.2	6.9	6.9	30
29	29	46	30	23	---	83	60	14	11	8.0	7.8	28
30	33	79	29	22	---	129	54	11	10	9.9	8.0	28
31	45	---	27	22	---	132	---	9.7	---	9.7	7.4	---
TOTAL	996	1321	859	766	846	2828	2380	664.7	372.8	401.1	267.4	490.1
MEAN	32.1	44.0	27.7	24.7	30.2	91.2	79.3	21.4	12.4	12.9	8.63	16.3
MAX	61	115	60	26	78	144	122	49	23	38	12	31
MIN	17	25	20	22	20	48	42	9.7	8.2	6.9	6.0	6.2
MEAN+	32.9	33.1	24.6	24.7	31.9	100	76.8	21.4	13.2	12.9	8.63	18.0
CFSM+	.48	.49	.36	.36	.47	1.47	1.13	.31	.19	.19	.13	.26
IN+	.56	.54	.42	.42	.49	1.69	1.26	.36	.22	.22	.15	.30

CAL YR 1976 TOTAL 25539.0 MEAN 69.8 MAX 388 MIN 11 MEAN+ 69.8 CFSM+ 1.02 IN+ 13.89
WTR YR 1977 TOTAL 12192.1 MEAN 33.4 MAX 144 MIN 6.0 MEAN+ 33.2 CFSM+ 0.47 IN+ 6.61

+Adjusted for change in contents in Stony Lake.

04162900 BIG BEAVER CREEK NEAR WARREN, MI

LOCATION.--Lat 42°32'31", long 83°02'52", in NW¼ SW¼ sec.33, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank between bridges on Mound Road, 1.0 mi (1.6 km) north of Warren, and 2.0 mi (3.2 km) upstream from mouth.

DRAINAGE AREA.--23.5 mi² (60.9 km²).

PERIOD OF RECORD.--October 1958 to current year.

GAGE.--Water-stage recorder. Datum of gage is 598.80 ft (182.514 m) above mean sea level (Macomb County bench mark). Prior to Aug. 26, 1960, nonrecording gage and crest-stage gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 13.4 ft³/s (0.379 m³/s), 7.74 in/yr (197 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,240 ft³/s (35.1 m³/s) June 26, 1968, gage height, 14.45 ft (4.404 m); no flow on several days in June and July 1962, caused by unusual regulation above gage; minimum natural discharge, 0.03 ft³/s (0.001 m³/s) Sept. 26, 1974.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 311 ft³/s (8.81 m³/s) Apr. 2, gage height, 8.61 ft (2.624 m), only peak above base of 300 ft³/s (8.50 m³/s); minimum daily, 0.08 ft³/s (0.002 m³/s) Jan. 4 to Feb. 8; minimum gage height, 4.65 ft (1.417 m) Jan. 21, 22, Feb. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.43	1.7	.82	.10	.08	8.5	10	2.6	7.0	6.3	.63	.34
2	.48	.53	.46	.09	.08	8.5	56	2.5	3.2	1.5	.49	1.7
3	.42	.22	.39	.09	.08	17	70	1.8	.85	.54	1.3	.69
4	.40	.18	.27	.08	.08	47	35	7.8	1.5	.38	3.9	.22
5	.43	.19	.14	.08	.08	31	34	6.6	.78	1.8	5.0	.22
6	26	.17	.15	.08	.08	16	11	6.4	12	.56	2.2	.22
7	15	.23	.15	.08	.08	9.4	7.2	2.5	2.4	.63	3.6	.22
8	3.2	.19	.15	.08	.08	4.8	4.0	1.8	.71	.80	1.4	.22
9	2.9	.18	.15	.08	.10	4.8	3.4	1.2	.62	11	.55	.29
10	.60	.22	.20	.08	.35	4.0	2.3	1.2	.53	1.2	1.5	.30
11	.39	.22	.15	.08	1.0	3.4	2.3	1.3	.61	.47	1.8	.25
12	.37	.22	.14	.08	2.0	17	1.5	1.4	1.0	1.3	4.0	.27
13	.38	.22	.13	.08	1.2	32	1.5	1.4	.77	.65	1.0	10
14	.37	.22	.20	.08	.45	17	1.4	3.1	.62	.36	.50	3.7
15	.80	.18	.62	.08	.20	8.8	1.5	1.3	.81	.47	.41	1.2
16	.39	.18	.71	.08	.15	3.4	1.5	1.1	1.0	4.5	.42	5.7
17	.26	.33	.33	.08	.13	2.6	1.2	.95	.71	.39	.46	1.4
18	.23	.46	.27	.08	.12	3.7	2.1	4.7	1.7	1.5	.40	16
19	.53	.14	.33	.08	.12	11	3.7	1.1	.91	4.6	.36	9.1
20	1.1	.22	2.8	.08	.11	9.4	1.7	.87	.54	2.3	.70	1.4
21	1.3	.14	1.2	.08	.11	10	1.5	.78	.40	1.1	.70	.57
22	1.5	.54	.60	.08	.20	16	15	2.0	.54	.57	.95	.40
23	.62	.18	.40	.08	3.0	14	71	2.6	.58	.40	.61	.66
24	1.7	.11	.30	.08	36	10	36	.93	.63	.60	3.1	.98
25	1.6	.14	.20	.08	22	3.7	58	.87	.54	5.2	1.3	1.0
26	.90	1.7	.15	.08	15	3.1	37	.77	.36	.98	.53	24
27	.54	20	.15	.08	11	3.1	23	.68	.54	.38	.33	2.3
28	.62	3.7	.15	.08	9.5	70	12	.79	.88	.32	.22	.73
29	.59	1.7	.10	.08	---	52	4.0	.77	14	.65	.60	.43
30	.92	1.2	.10	.08	---	23	2.6	.66	5.2	.50	.59	.44
31	5.3	---	.10	.08	---	15	---	1.1	---	.47	.30	---
TOTAL	70.27	35.61	12.01	2.52	103.38	479.2	511.4	63.57	61.93	52.42	39.85	84.95
MEAN	2.27	1.19	.39	.081	3.69	15.5	17.0	2.05	2.06	1.69	1.29	2.83
MAX	26	20	2.8	.10	36	70	71	7.8	14	11	5.0	24
MIN	.23	.11	.10	.08	.08	2.6	1.2	.66	.36	.32	.22	.22
CFSM	.10	.05	.02	.003	.16	.66	.72	.09	.09	.07	.06	.12
IN.	.11	.06	.02	.00	.16	.76	.81	.10	.10	.08	.06	.13

CAL YR 1976 TOTAL 2905.41 MEAN 7.94 MAX 241 MIN .10 CFSM .34 IN 4.60
WTR YR 1977 TOTAL 1517.11 MEAN 4.16 MAX 71 MIN .08 CFSM .18 IN 2.40

04163400 PLUM BROOK AT UTICA, MI

LOCATION.--Lat 42°36'05", long 83°04'27", in SE¼ NE¼ sec.7, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank at upstream side of bridge on Ryan Road, 1.0 mi (1.6 km) southwest of Utica.

DRAINAGE AREA.--16.5 mi² (42.7 km²).

PERIOD OF RECORD.--July 1965 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 619.79 ft (188.912 m) above mean sea level (levels by Johnson & Anderson Inc.).

REMARKS.--Records good except those for the winter period, which are fair. Occasional diversion for sprinkler irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--12 years, 9.89 ft³/s (0.280 m³/s), 10.70 in/yr (272 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,160 ft³/s (32.9 m³/s) June 26, 1968, gage height, 10.36 ft (3.158 m); no flow part of each day July 19, 28, 1966, Aug. 22-28, Sept. 3, 11, 1969; minimum gage height, 1.23 ft (0.375 m) Sept. 16, 1967.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 200 ft³/s (5.66 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 4	2300	223	6.32	6.24	1.902	Apr. 3	0100	*442	12.52	*8.22	2.505
Mar. 29	0300	304	8.61	7.25	2.210	Apr. 23	2200	233	6.60	6.42	1.957

Minimum discharge, 0.01 ft³/s (<0.001 m³/s) Aug. 19, gage height, 1.48 ft (0.451 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.6	4.5	2.4	1.4	1.2	15	28	9.7	5.3	10	.41	.48
2	1.5	3.4	2.2	1.4	1.2	11	86	13	3.6	2.8	.41	1.2
3	1.5	2.8	2.2	1.4	1.2	10	221	11	1.7	1.8	1.4	.87
4	1.7	2.6	2.1	1.3	1.2	100	61	13	1.4	1.5	2.7	.64
5	1.4	3.0	2.1	1.3	1.2	98	115	17	1.4	2.7	1.9	.66
6	2.5	2.8	2.1	1.3	1.2	27	47	14	6.6	1.5	1.6	.44
7	2.7	2.5	2.1	1.3	1.2	23	28	8.4	5.8	2.8	2.2	.81
8	6.8	2.6	2.1	1.2	1.2	21	19	6.8	2.6	5.3	1.5	.53
9	3.8	2.3	2.1	1.2	1.2	23	15	6.5	2.3	26	.89	.56
10	2.6	2.8	2.1	1.2	1.3	22	14	5.3	1.8	6.8	1.3	.64
11	3.4	2.7	2.1	1.2	1.5	19	14	5.1	1.7	3.8	2.9	.56
12	3.4	2.9	2.1	1.2	1.8	23	11	4.8	2.0	7.7	3.5	.39
13	2.5	2.8	2.1	1.2	1.9	74	9.3	4.5	1.8	3.8	1.6	7.2
14	1.7	2.3	2.1	1.2	1.9	39	7.8	3.4	2.0	2.1	1.2	7.6
15	1.7	2.1	2.1	1.2	1.8	30	8.2	3.0	2.3	2.2	.78	4.1
16	1.6	2.1	2.1	1.2	1.7	23	6.6	3.3	1.5	4.4	1.2	4.2
17	1.6	2.1	2.0	1.2	1.6	17	6.3	2.6	1.4	3.9	.76	2.7
18	2.3	2.1	2.0	1.2	1.6	13	6.5	7.8	1.8	4.2	.30	5.7
19	1.6	2.2	2.0	1.2	1.6	17	7.1	4.9	2.3	4.4	.11	8.8
20	3.4	2.2	2.0	1.2	1.6	26	7.1	3.2	1.4	3.2	.35	4.0
21	3.6	2.1	2.0	1.2	1.6	25	7.5	2.6	1.5	1.6	.60	2.4
22	3.4	2.0	2.0	1.2	1.7	37	16	2.5	2.3	2.2	.81	1.7
23	2.8	1.9	2.0	1.2	15	31	135	3.8	.81	.99	.39	2.9
24	3.4	1.9	1.9	1.2	90	24	104	1.8	.72	.77	1.2	2.3
25	3.6	2.1	1.9	1.2	60	16	120	2.3	1.1	1.8	.82	2.9
26	3.0	3.9	1.8	1.2	40	14	87	1.2	.96	1.4	.71	11
27	2.5	18	1.7	1.2	30	14	42	1.1	.71	3.0	.65	7.6
28	2.1	8.9	1.6	1.2	21	160	26	1.0	.54	.79	.48	3.8
29	2.3	3.5	1.6	1.2	---	215	16	.94	8.4	.90	.75	1.9
30	2.8	2.6	1.5	1.2	---	67	12	.60	5.9	.80	1.3	1.7
31	6.3	---	1.5	1.2	---	39	---	.94	---	.56	.64	---
TOTAL	85.1	99.7	61.6	38.2	288.4	1273	1283.4	166.08	73.64	115.71	35.36	90.28
MEAN	2.75	3.32	1.99	1.23	10.3	41.1	42.8	5.36	2.45	3.73	1.14	3.01
MAX	6.8	18	2.4	1.4	90	215	221	17	8.4	26	3.5	11
MIN	1.4	1.9	1.5	1.2	1.2	10	6.3	.60	.54	.56	.11	.39
CFSM	.17	.20	.12	.08	.62	2.49	2.59	.33	.15	.23	.07	.18
IN.	.19	.22	.14	.09	.65	2.87	2.89	.37	.17	.26	.08	.20

CAL YR 1976 TOTAL 6233.46 MEAN 17.0 MAX 309 MIN .35 CFSM 1.03 IN 14.05
WTR YR 1977 TOTAL 3610.47 MEAN 9.89 MAX 221 MIN .11 CFSM .60 IN 8.14

04164000 CLINTON RIVER NEAR FRASER, MI

LOCATION.--Lat 42°34'40", long 82°57'00", in NW¼ sec.20, T.2 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank 800 ft (244 m) downstream from bridge on Garfield Road, 2.8 mi (4.5 km) north of Fraser, and 4.0 mi (6.4 km) upstream from North Branch.

DRAINAGE AREA.--444 mi² (1,150 km²).

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 577.71 ft (176.086 m) above mean sea level. Prior to Nov. 17, 1949, nonrecording gage at site 800 ft (244 m) upstream at same datum.

REMARKS.--Records good except those for period of no gage-height record, Jan. 10 to Feb. 27, which are fair. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--30 years, 369 ft³/s (10.45 m³/s), 11.29 in/yr (287 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,000 ft³/s (227 m³/s) May 11, 1948, gage height, 19.5 ft (5.94 m), from graph based on gage readings, from rating curve extended above 4,000 ft³/s (113 m³/s); minimum, 47 ft³/s (1.33 m³/s) Sept. 6, 1955; minimum gage height, 4.29 ft (1.308 m) Sept. 7, 1954.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 5 or 6, 1947, reached a stage of 20 ft (6.1 m), from floodmarks; discharge, 9,000 ft³/s (255 m³/s), from rating curve extended above 4,000 ft³/s (113 m³/s).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 2,000 ft³/s (56.6 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 28	2200	2,400	68.0	13.73	4.185	Apr. 23	2000	2,520	71.4	13.94	4.249
Apr. 3	0100	*3,620	103	*15.16	4.621	Apr. 25	2300	2,430	68.8	13.79	4.203

Minimum discharge, 98 ft³/s (2.78 m³/s) Sept. 8, gage height, 5.06 ft (1.542 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	162	368	305	217	245	386	726	418	266	305	119	126
2	161	322	270	274	295	354	1120	405	174	176	120	167
3	167	312	248	317	260	384	2500	380	161	138	134	142
4	171	312	246	208	280	958	1150	450	150	132	211	118
5	218	295	233	167	260	1390	1210	403	146	162	264	104
6	745	282	231	167	210	726	978	348	322	164	222	110
7	914	255	236	179	190	531	733	285	274	154	184	131
8	443	254	219	192	160	487	644	265	181	233	148	115
9	363	258	222	199	205	548	576	245	168	654	137	123
10	322	252	248	200	220	635	528	250	155	296	184	141
11	291	252	255	200	240	604	504	239	151	230	168	107
12	279	245	224	198	270	665	496	245	169	297	224	109
13	255	239	210	196	270	1240	488	223	181	217	147	370
14	228	240	222	195	260	792	434	200	159	183	125	300
15	236	246	250	194	245	631	397	180	151	178	119	180
16	230	329	234	194	235	633	384	173	143	248	121	361
17	227	272	233	195	230	617	366	176	180	174	126	198
18	230	245	231	215	230	540	364	318	301	153	119	461
19	228	267	226	228	230	599	395	239	218	419	114	406
20	278	240	264	180	240	647	369	201	162	202	115	256
21	261	221	264	150	250	584	367	196	174	159	115	186
22	252	207	227	140	270	649	551	209	192	142	143	165
23	225	243	247	140	340	626	1680	261	183	140	123	172
24	252	230	235	170	900	474	1670	206	179	125	205	177
25	231	210	226	260	1000	483	1800	188	189	285	136	204
26	242	245	219	280	700	463	1660	176	171	145	119	757
27	234	594	199	150	460	448	835	160	163	132	119	308
28	224	382	215	125	420	1420	630	161	179	130	111	279
29	230	273	214	145	---	2080	510	149	467	129	114	289
30	240	233	208	160	---	1230	452	139	245	135	142	269
31	490	---	207	185	---	826	---	145	---	127	130	---
TOTAL	9049	8323	7268	6020	9115	22650	24517	7633	5954	6364	4558	6831
MEAN	292	277	234	194	326	731	817	246	198	205	147	228
MAX	914	594	305	317	1000	2080	2500	450	467	654	264	757
MIN	161	207	199	125	160	354	364	139	143	125	111	104
CFSM	.66	.62	.53	.44	.73	1.65	1.84	.55	.45	.46	.33	.51
IN.	.76	.70	.61	.50	.76	1.90	2.05	.64	.50	.53	.38	.57

CAL YR 1976 TOTAL 201162 MEAN 550 MAX 4800 MIN 135 CFSM 1.24 IN 16.85
WTR YR 1977 TOTAL 118282 MEAN 324 MAX 2500 MIN 104 CFSM .73 IN 9.91

04164100 EAST POND CREEK AT ROMEO, MI

LOCATION.--Lat 42°49'21", long 83°01'13", in NE¼ SE¼ sec.27, T.5 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank 10 ft (3 m) upstream from bridge on State Highway 53, and 1.4 mi (2.3 km) north of Romeo.

DRAINAGE AREA.--21.8 mi² (56.5 km²).

PERIOD OF RECORD.--September 1958 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 780 ft (238 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 15.4 ft³/s (0.436 m³/s), 9.59 in/yr (244 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 358 ft³/s (10.1 m³/s) Feb. 10, 1965, gage height, 4.48 ft (1.366 m); maximum gage height, 4.56 ft (1.390 m) Mar. 12, 1962, backwater from ice; minimum discharge, 0.8 ft³/s (0.023 m³/s) July 30, 31, 1964, Aug. 6, 7, 1965; minimum gage height, 0.71 ft (0.216 m) July 21, 1959.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 65 ft³/s (1.84 m³/s) Mar. 5, gage height, 2.11 ft (0.643 m); maximum gage height, 3.18 ft (0.969 m) Feb. 25, backwater from ice; no peak discharge above base of 80 ft³/s (2.27 m³/s); minimum, 2.1 ft³/s (0.059 m³/s) Aug. 3, gage height, 0.89 ft (0.271 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.1	13	9.0	7.5	6.6	15	40	18	4.0	5.0	2.9	3.6
2	7.4	12	9.0	7.0	6.6	16	39	17	4.5	3.3	2.7	3.9
3	4.2	8.7	9.0	7.0	6.6	23	40	16	4.0	3.2	2.5	3.6
4	4.8	9.2	9.5	7.0	6.6	39	35	15	3.8	3.3	3.4	3.5
5	8.0	14	9.5	7.0	6.6	57	44	15	3.6	10	3.7	3.6
6	17	13	10	7.0	7.0	38	37	13	5.8	17	3.4	4.0
7	22	11	11	7.0	7.0	32	32	11	5.6	6.1	3.4	4.9
8	18	10	11	7.0	7.0	32	29	8.7	5.0	4.5	3.3	5.4
9	14	9.9	11	7.0	7.0	37	27	7.3	4.9	9.2	3.0	5.8
10	11	9.8	11	7.0	7.0	42	26	6.0	5.0	5.0	3.3	4.5
11	10	9.5	11	7.0	7.0	39	26	3.2	8.2	5.1	3.3	3.6
12	9.5	8.9	10	7.0	7.0	40	24	3.2	7.0	18	3.3	4.0
13	9.2	8.6	10	7.0	7.0	56	23	4.2	5.8	14	2.8	3.2
14	9.3	6.9	10	7.0	7.0	46	21	11	5.0	5.8	4.0	4.9
15	9.3	6.9	9.5	7.0	7.0	40	20	8.6	4.3	4.0	5.1	4.6
16	8.4	7.0	9.5	6.8	7.0	36	19	7.5	3.0	3.7	4.2	5.9
17	7.2	7.1	9.0	6.6	7.0	32	19	6.1	3.0	3.6	3.9	5.6
18	6.2	8.8	9.0	6.6	7.0	31	19	4.0	4.8	7.7	3.5	6.4
19	12	14	9.0	6.6	7.0	30	18	6.8	3.2	7.7	3.4	7.4
20	13	12	8.5	6.6	7.0	30	16	8.0	3.4	8.5	3.3	7.2
21	12	10	8.5	6.6	7.0	29	14	6.9	2.8	3.7	3.4	7.1
22	11	9.6	8.5	6.6	8.0	30	16	5.9	2.8	3.1	3.5	6.1
23	10	9.0	8.0	6.6	9.3	28	30	4.7	3.2	3.0	3.2	5.5
24	11	8.5	8.0	6.6	25	25	28	4.1	3.2	3.0	3.3	6.4
25	11	7.1	8.0	6.6	22	24	25	4.5	3.2	3.6	3.3	8.0
26	8.9	9.8	8.0	6.6	19	24	26	4.1	3.2	3.0	3.0	17
27	9.6	18	7.5	6.6	17	23	26	4.3	3.2	3.2	3.0	16
28	13	21	7.5	6.6	15	40	22	4.4	3.4	2.8	3.0	12
29	12	13	7.5	6.6	---	52	20	4.5	6.2	3.5	3.0	9.7
30	11	10	7.5	6.6	---	40	19	4.0	3.9	3.7	3.1	8.8
31	15	---	7.5	6.6	---	41	---	4.0	---	3.2	3.1	---
TOTAL	333.1	314.3	282.0	211.3	260.3	1067	780	241.0	129.0	180.5	103.3	192.2
MEAN	10.7	10.5	9.10	6.82	9.30	34.4	26.0	7.77	4.30	5.82	3.33	6.41
MAX	22	21	11	7.5	25	57	44	18	8.2	18	5.1	17
MIN	4.2	6.6	7.5	6.6	6.6	15	14	3.2	2.8	2.8	2.5	3.2
CFSM	.49	.48	.42	.31	.43	1.58	1.19	.36	.20	.27	.15	.29
IN.	.57	.54	.48	.36	.44	1.82	1.33	.41	.22	.31	.18	.33

CAL YR 1976 TOTAL 8882.3 MEAN 24.3 MAX 153 MIN 4.2 CFSM 1.12 IN 15.16
WTR YR 1977 TOTAL 4094.0 MEAN 11.2 MAX 57 MIN 2.5 CFSM .51 IN 6.99

04164300 EAST BRANCH COON CREEK AT ARMADA, MI

LOCATION.--Lat 42°50'45", long 82°53'06", in NE¼ sec.23, T.5 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on right bank 10 ft (3 m) downstream from bridge on Prospect Street in Armada.

DRAINAGE AREA.--13.0 mi² (33.7 km²).

PERIOD OF RECORD.--October 1958 to current year.

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 735 ft (224 m) from topographic map (nearest 5 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 6.58 ft³/s (0.186 m³/s), 6.87 in/yr (174 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 910 ft³/s (25.8 m³/s) Apr. 19, 1975, gage height, 6.69 ft (2.039 m); no flow Jan. 25 to Feb. 10, 1961, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 80 ft³/s (2.27 m³/s) Mar. 29, gage height, 2.61 ft (0.796 m), no peak above base of 100 ft³/s (2.83 m³/s); minimum, .01 ft³/s (<0.001 m³/s) July 4; minimum gage height, 1.17 ft (0.357 m) July 3, 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.17	.22	.29	.18	.13	1.4	5.4	1.7	.14	.34	.06	.13
2	.14	.19	.25	.18	.12	.85	5.8	1.6	.12	.08	.06	.10
3	.14	.17	.24	.18	.12	.58	10	1.4	.09	.02	.41	.09
4	.08	.17	.24	.17	.12	5.1	7.7	1.3	.07	.01	.44	.04
5	.08	.17	.24	.17	.12	46	20	1.3	.10	.02	.29	.06
6	2.2	.17	.24	.17	.12	25	14	1.2	.26	.02	.13	.07
7	.75	.20	.24	.16	.12	12	6.5	1.1	.11	.03	.11	.05
8	.39	.16	.24	.16	.12	7.3	4.7	.95	.11	2.7	.08	.05
9	.50	.13	.22	.16	.12	11	3.4	.80	.12	4.2	.13	.04
10	.29	.12	.32	.16	.13	19	2.8	.68	.13	1.4	.11	.03
11	.20	.14	.30	.15	.14	17	2.5	.60	.12	1.1	.11	.04
12	.17	.11	.29	.15	.15	15	2.2	.57	.14	.84	.16	.04
13	.15	.11	.64	.15	.16	36	1.9	.50	.14	.38	.07	.59
14	.11	.16	.52	.15	.15	17	1.7	.49	.12	.25	.05	.30
15	.19	.20	.32	.14	.14	9.0	1.4	.45	.08	.24	.05	.16
16	.28	.20	.26	.14	.14	5.5	1.3	.44	.08	.26	.06	.48
17	.43	.19	.28	.14	.13	3.8	1.2	.44	.22	.16	.05	.22
18	.41	.28	.24	.14	.13	3.3	1.1	.49	.31	.12	.04	.88
19	.29	.19	.26	.14	.13	3.0	1.1	.50	.11	.11	.05	.43
20	.19	.14	.39	.14	.13	3.4	1.0	.48	.09	.07	.05	.14
21	.14	.14	.41	.14	.13	4.0	.99	.36	.13	.05	.05	.11
22	.14	.14	.29	.13	.13	5.6	1.3	.27	.08	.06	.07	.09
23	.14	.17	.27	.13	.80	5.7	14	.25	.07	.04	.04	.09
24	.17	.17	.24	.13	1.3	4.0	19	.24	.08	.06	.07	.42
25	.16	.16	.23	.13	1.9	3.5	10	.23	.09	.08	.06	.23
26	.15	.38	.22	.13	2.3	2.6	6.3	.16	.05	.05	.03	.72
27	.11	1.1	.21	.13	1.7	2.6	4.1	.13	.05	.03	.04	.11
28	.11	.50	.20	.13	1.2	22	3.0	.10	.16	.03	.04	.07
29	.13	.36	.20	.13	---	65	2.3	.09	.51	.11	.06	.07
30	.30	.31	.19	.13	---	23	1.9	.10	.29	.08	.06	.08
31	.43	---	.19	.13	---	9.7	---	.10	---	.07	.04	---
TOTAL	9.14	6.85	8.67	4.57	12.08	388.93	158.59	19.02	4.17	13.01	3.07	5.93
MEAN	.29	.23	.28	.15	.43	12.5	5.29	.61	.14	.42	.099	.20
MAX	2.2	1.1	.64	.18	2.3	65	20	1.7	.51	4.2	.44	.88
MIN	.08	.11	.19	.13	.12	.58	.99	.09	.05	.01	.03	.03
CFSM	.02	.02	.02	.01	.03	.96	.41	.05	.01	.03	.008	.02
IN.	.03	.02	.02	.01	.03	1.11	.45	.05	.01	.04	.01	.02

CAL YR 1976 TOTAL 4073.68 MEAN 11.1 MAX 309 MIN .04 CFSM .85 IN 11.66
WTR YR 1977 TOTAL 634.03 MEAN 1.74 MAX 65 MIN .01 CFSM .13 IN 1.81

04164500 NORTH BRANCH CLINTON RIVER NEAR MOUNT CLEMENS, MI

LOCATION.--Lat 42°37'45", long 82°53'25", in SW¼ sec.35, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank 30 ft (9 m) upstream from bridge on State Highway 59, 2 mi (3 km) north of Mount Clemens, and 3.6 mi (5.8 km) upstream from mouth.

DRAINAGE AREA.--199 mi² (515 km²).

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 1437: 1948. WSP 1557: Drainage area.

GAGE.--Water-stage recorder. Concrete control since September 1961. Datum of gage is 576.38 ft (175.681 m) above mean sea level (levels by Michigan Department of Natural Resources). Prior to Nov. 15, 1949, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for periods of no gage-height record (Aug. 28 to Sept. 23), which are poor. Some regulation at times by mill above station. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--30 years, 121 ft³/s (3.427 m³/s), 8.26 in/yr (210 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,700 ft³/s (190 m³/s) Feb. 2, 1968, gage height, 18.62 ft (5.675 m); minimum, 0.2 ft³/s (0.006 m³/s) Sept. 13, 14, 1954, July 30, 1965; minimum gage height, 3.12 ft (0.951 m) Sept. 13, 14, 1954.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 5 or 6, 1974, reached a stage of 20.0 ft (6.10 m), from floodmark.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 982 ft³/s (27.8 m³/s) Mar. 30, gage height, 11.36 ft (3.463 m), no peak above base of 1,200 ft³/s (34.0 m³/s); minimum not determined; minimum daily discharge, 1.8 ft³/s (0.051 m³/s) Sept. 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	37	30	20	18	160	302	87	14	15	5.9	2.0
2	17	37	28	20	18	140	255	80	15	16	3.7	2.7
3	16	34	25	20	18	110	676	74	16	13	3.1	3.2
4	15	31	21	20	18	250	536	68	15	9.0	3.1	3.0
5	12	28	23	20	18	500	379	71	14	9.9	4.6	3.0
6	18	28	24	20	18	680	391	72	15	16	6.7	2.7
7	49	30	24	19	18	470	323	62	17	14	8.4	2.3
8	69	28	24	19	18	290	198	51	21	17	7.2	2.5
9	54	26	22	19	19	300	149	44	19	45	5.3	2.5
10	36	26	26	19	19	327	126	39	16	89	3.7	2.1
11	29	25	29	19	20	347	114	36	15	45	5.3	2.0
12	25	25	27	19	20	293	104	33	15	26	6.1	1.9
13	23	24	26	19	20	397	94	31	16	30	8.1	1.8
14	22	24	22	18	21	480	86	29	15	29	6.9	4.0
15	20	22	23	18	21	414	79	31	13	19	3.7	14
16	19	20	23	18	22	250	73	30	11	12	2.4	8.0
17	19	21	23	18	22	173	70	28	9.2	9.8	3.4	8.0
18	18	22	23	17	23	140	68	30	9.7	8.7	3.9	13
19	17	22	24	17	23	129	65	32	9.6	11	2.6	8.6
20	19	24	26	17	24	146	63	28	11	17	2.0	22
21	25	27	26	17	25	169	63	28	8.3	12	2.2	14
22	26	25	22	17	26	204	71	26	7.8	9.4	3.1	12
23	25	23	24	17	28	234	304	26	5.5	5.4	3.4	11
24	25	20	24	17	120	201	800	24	3.9	3.1	3.7	9.6
25	25	23	22	17	330	150	806	24	4.8	4.0	3.4	9.5
26	25	24	22	17	340	130	458	21	5.4	6.5	2.0	13
27	25	33	21	18	270	119	242	18	4.8	5.4	2.0	19
28	23	59	21	18	220	257	159	16	3.5	3.7	2.0	34
29	23	57	21	18	---	678	118	15	4.0	2.9	2.1	23
30	25	32	21	18	---	926	99	14	9.4	2.6	2.2	17
31	29	---	20	18	---	598	---	14	---	4.6	2.1	---
TOTAL	789	857	737	568	1757	9662	7271	1182	343.9	511.0	124.3	271.4
MEAN	25.5	28.6	23.8	18.3	62.8	312	242	38.1	11.5	16.5	4.01	9.05
MAX	69	59	30	20	340	926	806	87	21	89	8.4	34
MIN	12	20	20	17	18	110	63	14	3.5	2.6	2.0	1.8
CFSM	.13	.14	.12	.09	.32	1.57	1.22	.19	.06	.08	.02	.05
IN.	.15	.16	.14	.11	.33	1.81	1.36	.22	.06	.10	.02	.05

CAL YR 1976 TOTAL 67496.3 MEAN 184 MAX 3000 MIN 5.9 CFSM .93 IN 12.62
WTR YR 1977 TOTAL 24073.6 MEAN 66.0 MAX 926 MIN 1.8 CFSM .33 IN 4.50

04164800 MIDDLE BRANCH CLINTON RIVER AT MACOMB, MI

LOCATION.--Lat 42°42'23", long 82°57'33", in SW¼ sec.5, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank at downstream side of bridge on Romeo Plank Road, 0.4 mi (0.6 km) north of Macomb.

DRAINAGE AREA.--41.0 mi² (106.2 km²).

PERIOD OF RECORD.--Water years 1959-62, 1969 (annual maximum and occasional low-flow measurements), October 1962 to September 1968, October 1969 to current year.

GAGE.--Water-stage recorder. Datum of gage is 603.23 ft (183.865 m) above mean sea level (levels by Corps of Engineers). Oct. 28, 1958, to Nov. 14, 1962, and Oct. 12, 1968, to Dec. 17, 1969, crest-stage gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--14 years, 27.5 ft³/s (0.779 m³/s), 9.11 in/yr (231 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,580 ft³/s (44.7 m³/s) June 26, 1968; maximum gage height, 16.16 ft (4.926 m) Mar. 12, 1962, backwater from ice; minimum discharge, 0.10 ft³/s (0.003 m³/s) July 22, 1971; minimum gage height, 4.68 ft (1.426 m) July 11, 1964.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft³/s (8.50 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 24	1430	ice jam		*11.26	3.432	Mar. 28	2030	*577	16.3	10.10	3.078
Mar. 5	--	430	12.2	ice jam		Apr. 2	2300	479	13.6	9.34	2.847
Mar. 13	0200	328	9.29	8.15	2.484	Apr. 23	1900	540	15.3	9.82	2.993

Minimum discharge, 1.0 ft³/s (0.028 m³/s) Sept. 11, 12, gage height, 4.77 ft (1.454 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.7	11	9.5	5.6	5.9	45	52	22	5.2	4.8	2.8	1.9
2	3.3	9.5	8.5	5.6	5.9	40	147	22	5.2	1.9	2.4	2.4
3	3.7	9.1	7.2	5.6	6.0	90	184	19	4.8	2.6	2.8	2.8
4	2.7	8.7	6.8	5.6	6.0	180	95	24	4.1	2.8	7.3	1.9
5	2.6	8.5	6.6	5.7	6.1	240	171	26	4.1	4.5	5.9	1.7
6	39	8.1	6.4	5.7	6.2	150	78	20	9.0	2.8	4.8	1.9
7	32	7.6	6.2	5.8	6.4	100	55	15	5.9	1.7	5.2	1.7
8	13	7.2	6.0	5.8	6.5	110	45	13	5.5	3.8	4.8	1.5
9	10	6.9	5.8	5.8	6.6	90	40	12	5.5	37	4.1	1.5
10	8.6	7.6	5.7	5.8	6.7	75	39	11	4.8	5.9	4.1	1.3
11	8.0	7.2	5.6	5.8	6.8	55	36	10	4.5	5.2	4.5	1.2
12	7.4	8.8	5.6	5.8	7.0	75	32	11	5.9	11	5.5	1.3
13	7.0	7.5	5.6	5.8	7.1	185	29	9.0	5.9	6.2	3.8	7.3
14	6.4	7.8	5.6	5.8	7.3	77	26	8.1	5.2	5.5	2.8	7.3
15	6.0	11	5.6	5.8	7.5	57	24	7.3	4.5	4.8	2.4	4.5
16	5.6	10	5.5	5.9	7.8	44	23	6.9	4.5	4.1	2.4	7.3
17	5.7	10	5.5	5.9	8.0	36	24	7.3	4.8	4.8	2.6	5.9
18	6.2	7.8	5.5	5.9	8.3	39	22	12	7.3	4.8	1.9	9.0
19	7.1	8.1	5.5	6.0	8.6	49	21	7.7	5.2	9.4	1.9	9.4
20	10	8.0	5.5	6.0	9.0	65	24	6.6	4.5	5.5	2.4	6.2
21	8.8	8.1	5.5	6.0	9.5	63	23	6.2	4.1	3.8	2.4	5.5
22	8.1	8.8	5.5	6.0	11	82	32	5.9	3.2	3.4	3.8	5.2
23	7.1	10	5.5	6.0	30	69	293	6.2	2.8	2.8	2.6	4.8
24	8.7	11	5.5	6.0	110	49	178	5.5	2.8	2.6	3.0	5.2
25	8.8	9.5	5.5	5.9	120	41	124	5.2	2.6	7.3	2.6	6.9
26	7.7	12	5.5	5.9	90	41	85	4.8	2.1	3.8	2.1	11
27	6.8	27	5.5	5.9	70	39	51	4.1	1.9	3.0	1.9	5.9
28	6.2	15	5.5	5.9	55	311	37	3.8	1.7	2.6	1.9	4.8
29	6.0	11	5.5	5.9	---	348	30	3.2	5.2	3.0	1.7	4.8
30	6.2	10	5.5	5.9	---	100	26	3.8	3.8	5.2	3.0	4.8
31	16	---	5.5	5.9	---	64	---	3.2	---	3.4	2.4	---
TOTAL	278.4	292.8	184.7	181.0	635.2	3009	2046	321.8	136.6	170.0	101.8	136.9
MEAN	8.98	9.76	5.96	5.84	22.7	97.1	68.2	10.4	4.55	5.48	3.28	4.56
MAX	39	27	9.5	6.0	120	348	293	26	9.0	37	7.3	11
MIN	2.6	6.9	5.5	5.6	5.9	36	21	3.2	1.7	1.7	1.7	1.2
CFSM	.22	.24	.15	.14	.55	2.37	1.66	.25	.11	.13	.08	.11
IN.	.25	.27	.17	.16	.58	2.73	1.86	.29	.12	.15	.09	.12

CAL YR 1976 TOTAL 14165.5 MEAN 38.7 MAX 624 MIN 1.2 CFSM .94 IN 12.85
WTR YR 1977 TOTAL 7494.2 MEAN 20.5 MAX 348 MIN 1.2 CFSM .50 IN 6.80

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI

LOCATION.--Lat 42°35'45", long 82°54'35", Macomb County, Hydrologic Unit 04090003, on left bank 20 ft (6 m) downstream from bridge on Moravian Drive, 0.2 mi (0.3 km) downstream from North Branch, and 0.5 mi (0.8 km) west of Mount Clemens.

DRAINAGE AREA.--734 mi² (1,901 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1934 to current year.

REVISED RECORDS.--WSP 1084: 1943, 1945-46. WSP 1937: 1935, 1936(M), 1937-39, 1949(M), 1950. WSP 1557: Drainage area. WSP 1727: 1952(M), 1954(M).

GAGE.--Water-stage recorder. Datum of gage is 570.43 ft (173.867 m) above mean sea level. May 10, 1934, to Jan. 11, 1939, nonrecording gage at same site and datum. Auxiliary gage is a water-stage recorder on right bank 2.0 mi (3.2 km) downstream from base gage at same datum. Mar. 15, 1938, to Jan. 3, 1952, auxiliary nonrecording gage 1.6 mi (2.6 km) downstream from base gage at same datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--43 years, 523 ft³/s (14.81 m³/s), 9.68 in/yr (246 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 21,200 ft³/s (600 m³/s) Apr. 6, 1947, gage height, 23.55 ft (7.178 m), from flood-mark; minimum not determined; minimum gage height, 2.72 ft (0.829 m) Nov. 29, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,000 ft³/s (85.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 29	1100	3,590	102	9.90	3.018
Apr. 3	0800	*4,770	135	*11.31	3.447
Apr. 24	0400	3,680	104	10.01	3.051

Minimum daily discharge, 115 ft³/s (3.26 m³/s) Aug. 17, Sept. 5; minimum gage height, 4.82 ft (1.469 m) Nov. 22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	230	482	320	250	280	740	1280	581	309	364	140	140
2	222	439	300	290	320	634	1540	553	197	196	150	170
3	224	405	280	350	320	719	4100	540	192	155	157	150
4	240	408	280	260	320	1380	2250	586	175	151	252	130
5	281	385	280	220	300	2460	2100	595	179	207	294	115
6	725	384	280	210	260	1690	1740	515	361	182	286	120
7	1210	351	280	220	230	1330	1340	404	338	150	193	140
8	620	274	270	230	200	1110	1090	372	220	285	156	130
9	513	340	270	240	240	1100	913	299	191	1040	226	140
10	431	330	290	240	280	1220	809	317	178	480	200	150
11	395	305	300	240	280	1190	741	306	165	318	180	120
12	388	309	280	240	310	1180	719	312	185	378	297	120
13	358	294	270	240	310	2100	687	282	223	277	179	400
14	283	293	270	230	300	1620	618	257	186	269	155	340
15	280	306	270	230	290	1310	545	232	172	203	130	210
16	275	365	270	230	280	1090	522	219	170	296	130	390
17	270	351	270	230	280	1010	501	210	204	209	115	230
18	270	287	270	250	280	856	494	379	331	205	130	500
19	275	321	270	280	280	915	526	317	257	485	125	450
20	310	298	300	240	290	1030	511	260	185	253	125	323
21	310	299	310	190	290	988	494	249	168	175	130	200
22	300	266	310	170	310	1120	692	249	208	165	160	190
23	270	268	300	170	335	1160	2240	334	202	157	140	190
24	300	275	290	220	1350	897	3380	267	189	128	220	200
25	280	258	280	290	1680	826	2950	238	191	321	150	270
26	280	287	270	330	1060	768	2760	212	183	181	130	878
27	280	649	260	190	1110	726	1370	190	179	166	130	434
28	270	500	260	160	945	1900	977	193	180	150	120	350
29	280	350	250	180	---	3480	778	179	511	140	130	330
30	352	320	250	200	---	2720	647	152	253	146	150	320
31	586	---	250	220	---	1780	---	177	---	145	140	---
TOTAL	11308	10399	8650	7240	12710	41049	39314	9976	6682	7977	5220	7830
MEAN	365	347	279	234	454	1324	1310	322	223	257	168	261
MAX	1210	649	320	350	1680	3480	4100	595	511	1040	297	878
MIN	222	258	250	160	280	634	494	152	165	128	115	115
CFSM	.50	.47	.38	.32	.62	1.80	1.79	.44	.30	.35	.23	.36
IN.	.57	.53	.44	.37	.64	2.08	1.99	.51	.34	.40	.26	.40

CAL YR 1976 TOTAL 296574 MEAN 810 MAX 6730 MIN 176 CFSM 1.10 IN 15.03
WTR YR 1977 TOTAL 168356 MEAN 461 MAX 4100 MIN 115 CFSM .63 IN 8.53

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to current year.
WATER TEMPERATURES: October 1974 to current year.

INSTRUMENTATION.--Water quality monitor since Aug. 13, 1975.

REMARKS.--Interruptions in daily record were due to malfunctions of the instrument. Monthly samples are collected as a cross section sample at the bridge.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1975 and 1976): Maximum, 2,760 micromhos Jan. 26, 1976; minimum, 126 micromhos, July 29, 1976.
WATER TEMPERATURES: Maximum, 28.5°C July 20, 21, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 28.5°C July 20, 21; minimum, 0.0°C on many days during winter period.

REVISIONS.--The September 1976 maximum, minimum, and mean specific conductance values previously published were incorrect. No specific conductance data are available for September 1976. The following revised water temperatures supersede those previously published:

TEMPERATURE (DEG. C) OF WATER

DATE	MAX	MIN	MEAN
Sept. 28, 1976	15.0	--	--
Sept. 29 . . .	15.0	13.5	14.5
Sept. 30 . . .	15.5	14.0	15.0

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UM-MF (COL./ 100 ML)	FECAL STREPTOCOCCI KF AGAR (COL. PER 100 ML)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)
OCT												
15...	0930	280	75[illegible]	7.9	12.5	8.5	81	6600	897	620	260	73
NOV												
18...	1100	301	730	8.1	2.0	13.0	96	3900	B1800	1700	270	73
DEC												
16...	1030	270	911	7.8	.5	11.8	84	2200	470	21	260	63
JAN												
26...	1130	340	960	7.8	.0	10.8	71	2100	320	680	260	71
FEB												
16...	1200	280	936	7.7	.0	7.9	56	3500	B150	>2000	250	37
MAR												
22...	1415	1070	966	7.7	4.0	11.8	89	86000	B300	>2000	280	88
APR												
14...	1000	625	781	7.7	14.0	8.9	86	7000	210	180	280	75
MAY												
12...	1030	358	922	7.6	15.0	7.4	73	5700	470	250	300	84
JUN												
02...	1230	164	800	--	16.5	--	--	B86000	3900	1800	270	90
JUL												
20...	1200	213	700	7.8	26.0	6.2	77	50000	B1100	1000	210	71
AUG												
11...	0945	165	686	8.0	24.0	--	--	6600	3600	560	200	61
SEP												
20...	1000	360	696	7.9	19.0	6.7	74	>80000	4900	5600	210	66

B--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	DIS-SOLVED SODIUM (NA) (MG/L)	SODIUM AD-SORP-TION RATIO	DIS-SOLVED PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)	ALKA-LINITY AS C4CO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DIS-SOLVED SULFATE (SO4) (MG/L)	DIS-SOLVED CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)
OCT												
15...	70	21	52	1.4	5.1	230	0	189	4.6	75	81	.5
NOV												
18...	70	22	45	1.2	4.5	240	0	197	3.1	64	74	.4
DEC												
16...	68	21	72	2.0	4.7	240	0	197	6.1	72	110	.4
JAN												
26...	68	22	77	2.1	4.8	230	0	189	5.8	65	140	.5
FEB												
18...	67	21	87	2.4	5.0	260	0	213	8.3	77	130	.7
MAR												
22...	76	21	74	1.9	4.2	230	0	190	7.3	71	140	.2
APR												
14...	74	23	49	1.3	3.8	250	0	205	8.0	60	87	.3
MAY												
12...	81	23	70	1.8	4.9	260	0	210	10	74	120	.3
JUN												
02...	75	20	70	1.9	6.0	220	0	180	--	73	110	.4
JUL												
20...	58	15	50	1.5	5.2	170	0	139	4.3	54	80	.3
AUG												
11...	55	16	60	1.8	5.6	170	0	139	2.7	61	88	.5
SEP												
20...	59	15	50	1.5	5.4	176	0	144	3.5	58	81	.4

DATE	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	SUS-PENDED SEDI-MENT (MG/L)	SUS-PENDED SEDI-MENT DIS-CHARGE (T/DAY)	SUS. SED. SIEVE DIAM. % FINER THAN .062 MM
OCT											
15...	7.0	418	425	316	3.6	4.6	20	.37	14	11	100
NOV											
18...	4.7	415	403	337	3.1	4.0	17	.34	13	11	100
DEC											
16...	5.7	498	472	363	3.2	4.5	20	.22	6	4.4	100
JAN											
26...	6.5	496	497	455	3.3	6.3	28	.44	10	9.2	100
FEB											
18...	7.1	557	523	421	4.4	5.9	26	.44	14	11	100
MAR											
22...	6.5	572	506	1650	1.9	3.1	14	.17	31	90	100
APR											
14...	3.4	447	424	754	2.0	3.4	15	.03	44	74	100
MAY											
12...	3.1	--	504	487	3.2	4.4	19	.29	33	32	100
JUN											
02...	6.5	491	469	217	4.8	6.2	27	.40	30	13	100
JUL											
20...	6.3	410	353	236	2.3	3.8	17	.31	47	27	100
AUG											
11...	5.7	395	376	176	3.8	5.2	23	.49	33	15	100
SEP											
20...	7.4	385	363	374	2.6	--	--	.32	81	79	100

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	TOTAL ARSENIC (AS) (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	TOTAL CAD-MIUM (CD) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	TOTAL CHRO-MIUM (CR) (UG/L)	DIS-SOLVED CHRO-MIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	TOTAL IRON (FE) (UG/L)
OCT												
15...	0930	2	2	1	1	<10	<10	0	0	10	0	670
JAN												
26...	1130	1	0	3	2	<40	<10	0	0	10	10	540
APR												
14...	1000	--	1	2	1	10	10	0	0	10	0	1400
JUL												
20...	1200	3	2	--	7	20	4	0	0	16	4	2000

DATE	DIS-SOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	TOTAL MAN-GANESE (MN) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	TOTAL SELE-NIUM (SE) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	TOTAL ZINC (ZN) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	TOTAL ORGANIC CARBON (C) (MG/L)
OCT												
15...	10	11	7	60	50	<.5	<.5	0	0	30	20	8.9
JAN												
26...	50	8	2	70	60	<.5	<.5	20	0	70	70	8.5
APR												
14...	50	17	4	110	50	.7	<.5	--	0	60	10	8.7
JUL												
20...	20	65	58	100	60	.0	.0	0	0	50	0	8.0

[1]

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
PERIPHYTON

DATE	LENGTH OF EXPO-SURE (DAYS)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)
SEP						
20...	40	881	14.6	18.3	4.20	4.80

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	TOTAL ALDRIN (UG/L)	ALDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ATRAZINE (UG/L)	ATRAZINE IN BOTTOM MATERIAL (UG/KG DRY SOLIDS)	TOTAL CHLORDANE (UG/L)	CHLORDANE IN BOTTOM MATERIAL (UG/KG)	TOTAL DDD (UG/L)	TOTAL DDE (UG/L)	TOTAL DDT (UG/L)	DDT IN BOTTOM MATERIAL (UG/KG)	TOTAL DIAZINON (UG/L)
NOV												
18...	1100	ND	ND	ND	ND	ND	4	ND	ND	ND	ND	ND
FEB												
18...	1200	ND	--	ND	--	ND	--	ND	ND	ND	--	ND
MAY												
12...	1030	ND	--	ND	--	ND	--	ND	ND	ND	--	ND
AUG												
11...	0945	ND	--	ND	--	ND	--	ND	ND	ND	--	ND

DATE	DIAZINON IN BOTTOM MATERIAL (UG/KG)	TOTAL DIELDRIN (UG/L)	DIELDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ENDRIN (UG/L)	ENDRIN IN BOTTOM MATERIAL (UG/KG)	TOTAL ETHION (UG/L)	ETHION IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR (UG/L)	HEPTACHLOR IN BOTTOM MATERIAL (UG/KG)	TOTAL HEPTACHLOR EPOXIDE (UG/L)	HEPTACHLOR EPOXIDE IN BOTTOM MATERIAL (UG/KG)	TOTAL LINDANE (UG/L)
NOV												
18...	ND	ND	.2	ND	ND	ND	ND	ND	ND	ND	ND	ND
FEB												
18...	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND
MAY												
12...	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND
AUG												
11...	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND

DATE	LINDANE IN BOTTOM MATERIAL (UG/KG)	TOTAL MALATHION (UG/L)	MALATHION IN BOTTOM MATERIAL (UG/KG)	TOTAL METHOXYCHLOR (UG/L)	METHOXYCHLOR IN BOTTOM MATERIAL (UG/KG)	TOTAL METHYL PARATHION (UG/L)	METHYL PARATHION IN BOTTOM MATERIAL (UG/KG)	TOTAL METHYL TRITHION (UG/L)	METHYL TRITHION IN BOTTOM MATERIAL (UG/KG)	TOTAL PARATHION (UG/L)	PARATHION IN BOTTOM MATERIAL (UG/KG)	SIMAZINE TOTAL COULSON COND. (UG/L)
NOV												
18...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FEB												
18...	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND
MAY												
12...	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND
AUG												
11...	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND

DATE	SIMAZINE IN BOTTOM MATERIAL (UG/KG DRY SOLIDS)	TOTAL TOXAPHENE (UG/L)	TOXAPHENE IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	TRITHION IN BOTTOM MATERIAL (UG/KG)	TOTAL 2,4-D (UG/L)	2,4-D IN BOTTOM MATERIAL (UG/KG)	TOTAL 2,4,5-T (UG/L)	2,4,5-T IN BOTTOM MATERIAL (UG/KG)	TOTAL SILVEX (UG/L)	SILVEX IN BOTTOM MATERIAL (UG/KG)
NOV											
18...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FEB											
18...	--	ND	--	ND	--	ND	--	ND	--	ND	--
MAY											
12...	--	ND	--	ND	--	ND	--	ND	--	ND	--
AUG											
11...	--	ND	--	ND	--	--	--	--	--	--	--

ND--NOT DETECTED

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	OCT 15,76		NOV 18,76		DEC 16,76		JAN 26,77		FEB 18,77	
TIME	0930		1100		1030		1130		1200	
TOTAL CELLS/ML	1600		3000		4700		1100		2600	
DIVERSITY: DIVISION	0.7		1.3		0.9		1.1		1.2	
.CLASS	0.7		1.3		0.9		1.1		1.2	
..ORDER	1.2		1.8		1.2		1.4		1.3	
...FAMILY	2.1		2.1		1.5		1.9		1.8	
....GENUS	2.1		2.2		1.5		2.1		2.1	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	14	1	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	91	6	--	-	--	-	*	0	50	2
....CHLORELLA	--	-	--	-	--	-	21	2	--	-
....KIRCHNERIELLA	--	-	29	1	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	91	6	--	-	--	-	--	-	230	9
....TETRASTRUM	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	--	-	*	0	--	-	25	1
....CHLOROGONIUM	--	-	--	-	--	-	11	1	--	-
...PHACOTACEAE										
....PHACOTUS	46	3	--	-	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	46	3	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	--	-	--	-	--	-
...ZYGNEMATACEAE										
....MOUGEOTIA	--	-	430	14	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	140	8	290	10	*	0	--	-	25	1
....MELOSIRA	--	-	--	-	--	-	21	2	*	0
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	*	0
....COCCONEIS	91	6	--	-	50	1	7	1	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	*	0	25	1
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	--	-
....CYMBELLA	46	3	--	-	--	-	*	0	*	0
...DIATOMACEAE										
....DIATOMA	--	-	--	-	84	2	14	1	15	1
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	--	-	--	-	*	0
....FRAGILARIA	--	-	1600#	54	1000#	22	28	2	*	0
....SYNEDRA	--	-	--	-	*	0	11	1	15	1
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	*	0	--	-	28	2	64	3
...NAVICULACEAE										
....GYROSIGMA	--	-	--	-	--	-	*	0	--	-
....NAVICULA	91	6	44	1	67	1	53	5	94	4
....PINNULARIA	--	-	44	1	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	1000#	61	29	1	--	-	14	1	150	6
...SURIRELLACEAE										
....CYMATOPLEURA	--	-	--	-	--	-	7	1	--	-
....SURIRELLA	--	-	44	1	*	0	14	1	40	2
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	OCT 15,76		NOV 18,76		DEC 16,76		JAN 26,77		FEB 18,77	
TIME	0930		1100		1030		1130		1200	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA(BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....ANACYSTIS										
.....A.INCERTA	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	--	-	200	4	46	4	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	120	5
....OSCILLATORIA	--	-	370	12	3200#	68	790#	70	1600#	64
....SPIRULINA	--	-	--	-	--	-	18	2	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	*	0
...CRYPTOMONODACEAE										
....CRYPTOMONAS	--	-	29	1	--	-	25	2	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	*	0
....TRACHELOMONAS	--	-	44	1	34	1	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..GYMNODINIALES										
...GYMNODINIACEAE										
....GYMNODINIUM	--	-	--	-	--	-	--	-	*	0
..PERIDINIALES										
...PERIDINIACEAE										
....PERIDINIUM	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	MAY 12,77	JUN 2,77	JUL 20,77	AUG 11,77	SEP 20,77
TIME	1030	1230	1200	0945	1000
TOTAL CELLS/ML	2100	5500	4000	20000	4300
DIVERSITY: DIVISION	0.3	1.6	1.3	1.0	1.6
.CLASS	0.3	1.7	1.3	1.0	1.6
..ORDER	0.3	2.0	1.7	1.5	2.3
...FAMILY	2.5	2.3	3.3	2.0	3.5
....GENUS	2.8	2.4	3.7	2.0	3.7

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	*	0	--	-	--	-	150	3
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	*	0	1100#	28	--	-	780#	18
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	23	1	200	1	--	-
....MICRACTINIUM	--	-	--	-	180	5	410	2	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	21	1	100	2	--	-	4900#	24	130	3
....CHLORELLA	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	*	0	23	1	--	-	*	0
....OOCYSTIS	--	-	130	2	--	-	--	-	54	1
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	--	-	180	5	--	-	--	-
....SCENEDESMUS	--	-	610	11	320	8	610	3	240	6
....TETRASTRUM	--	-	--	-	92	2	--	-	73	2
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	51	1	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-	*	0
....CHLOROGONIUM	--	-	--	-	--	-	--	-	--	-
...PHACOTACEAE										
....PHACOTUS	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	--	-	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	69	2	--	-	--	-
...ZYGNEMATACEAE										
....MOUGEOTIA	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	--	-	260	5	270	7	11000#	56	250	6
....MELOSIRA	--	-	51	1	46	1	--	-	290	7
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	120	6	*	0	--	-	--	-	--	-
....COCCONEIS	21	1	*	0	--	-	200	1	--	-
....RHOICOSPHENIA	41	2	*	0	110	3	--	-	110	3
...CYMBELLACEAE										
....AMPHORA	--	-	*	0	--	-	--	-	*	0
....CYMBELLA	41	2	51	1	69	2	--	-	54	1
...DIATOMACEAE										
....DIATOMA	62	3	*	0	69	2	410	2	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	--	-	--	-	--	-
....FRAGILARIA	100	5	*	0	--	-	--	-	--	-
....SYNEDRA	120	6	*	0	180	5	610	3	36	1
...GOMPHONEMATACEAE										
....GOMPHONEMA	82	4	*	0	46	1	--	-	36	1
...NAVICULACEAE										
....GYROSIGMA	--	-	--	-	--	-	--	-	--	-
....NAVICULA	700#	33	130	2	340	9	820	4	330	8
....PINNULARIA	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	680#	32	2000#	36	390	10	410	2	240	6
...SURIRELLACEAE										
....CYMATOPLEURA	--	-	*	0	--	-	--	-	*	0
....SURIRELLA	62	3	*	0	210	5	--	-	150	3
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	*	0	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAY 12,77 1030		JUN 2,77 1230		JUL 20,77 1200		AUG 11,77 0945		SEP 20,77 1000	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA(BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCCOCCALES										
...CHROCCOCCACEAE										
....ANACYSTIS										
.....A.INCERTA										
....ANACYSTIS	--	-	--	-	--	-	--	-	730#	17
..HORMOGONALES	--	-	--	-	--	-	--	-	150	3
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	180	4
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	1900#	35	--	-	--	-	220	5
....SPIRULINA	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	--	-	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	62	3	130	2	110	3	410	2	--	-
....TRACHELOMONAS	21	1	51	1	110	3	--	-	*	0
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..GYMNODINIALES										
...GYMNODINIACEAE										
....GYMNODINIUM	--	-	--	-	--	-	--	-	--	-
..PERIDINIALES										
...PERIDINIACEAE										
....PERIDINIUM	--	-	*	0	23	1	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	669	572	635				---	---	---
2	---	---	---	704	675	692				---	---	---
3	---	---	---	726	707	713				---	---	---
4	---	---	---	743	729	734				---	---	---
5	---	---	---	760	737	749				---	---	---
6	---	---	---	758	737	745				---	---	---
7	---	---	---	753	737	747				---	---	---
8	---	---	---	761	740	745				---	---	---
9	---	---	---	754	728	740				---	---	---
10	---	---	---	759	745	753				---	---	---
11	---	---	---	802	762	783				---	---	---
12	---	---	---	783	757	767				---	---	---
13	---	---	---	757	747	750				---	---	---
14	---	---	---	750	737	740				---	---	---
15	---	---	---	735	706	728				---	---	---
16	---	---	---	702	635	667				---	---	---
17	---	---	---	692	638	669				---	---	---
18	---	---	---	---	---	---				---	---	---
19	---	---	---	---	---	---				---	---	---
20	---	---	---	---	---	---				---	---	---
21	788	751	770	---	---	---				---	---	---
22	786	756	772	---	---	---				---	---	---
23	776	765	770	---	---	---				---	---	---
24	775	725	756	---	---	---				---	---	---
25	749	705	726	---	---	---				---	---	---
26	741	712	729	---	---	---				---	---	---
27	738	696	713	---	---	---				951	943	947
28	728	702	717	---	---	---				962	943	955
29	746	731	740	---	---	---				951	939	946
30	746	718	733	---	---	---				957	948	952
31	752	604	663	---	---	---				956	949	952
MONTH	788	604	735	802	572	727				962	939	950

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	965	943	951	---	---	---	739	676	710	---	---	---
2	959	945	948	---	---	---	830	433	715	---	---	---
3	963	957	961	---	---	---	491	377	417	---	---	---
4	969	959	962	---	---	---	639	499	570	---	---	---
5	980	966	969	---	---	---	674	611	632	---	---	---
6	980	968	975	---	---	---	654	624	641	---	---	---
7	982	976	979	---	---	---	680	642	661	---	---	---
8	983	972	976	---	---	---	712	684	701	---	---	---
9	974	963	969	---	---	---	734	713	728	---	---	---
10	972	963	968	---	---	---	746	724	733	---	---	---
11	1070	972	1020	---	---	---	762	735	750	---	---	---
12	1140	1080	1120	---	---	---	785	754	766	936	873	891
13	1170	1150	1160	---	---	---	778	756	768	964	820	920
14	1160	1150	1160	---	---	---	---	---	---	992	886	947
15	1150	1140	1150	---	---	---	---	---	---	1010	880	932
16	1140	1130	1130	---	---	---	---	---	---	1120	897	1050
17	1130	1110	1120	---	---	---	---	---	---	1170	1020	1120
18	---	---	---	---	---	---	---	---	---	1200	1060	1150
19	---	---	---	---	---	---	---	---	---	1220	1080	1180
20	---	---	---	---	---	---	---	---	---	1180	1050	1140
21	---	---	---	---	---	---	---	---	---	1170	1050	1130
22	---	---	---	---	---	---	---	---	---	---	---	---
23	---	---	---	1070	842	920	---	---	---	---	---	---
24	---	---	---	871	807	840	---	---	---	---	---	---
25	---	---	---	874	807	841	---	---	---	---	---	---
26	---	---	---	835	818	825	---	---	---	---	---	---
27	---	---	---	835	815	825	---	---	---	---	---	---
28	---	---	---	955	648	784	---	---	---	---	---	---
29	---	---	---	645	530	562	---	---	---	---	---	---
30	---	---	---	599	556	573	---	---	---	---	---	---
31	---	---	---	673	592	628	---	---	---	---	---	---
MONTH	1170	943	1030	1070	530	755	830	377	676	1220	820	1050

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED
SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	1090	978	1030				---	---	---
2	---	---	---	---	---	---				---	---	---
3	944	800	859	---	---	---				---	---	---
4	1010	883	943	---	---	---				---	---	---
5	1030	959	983	920	872	898				---	---	---
6	983	600	833	905	890	895				---	---	---
7	718	615	688	904	875	884				---	---	---
8	831	673	742	908	696	873				---	---	---
9	881	778	831	629	559	586				---	---	---
10	949	827	884	628	603	611				---	---	---
11	949	881	909	684	614	642				---	---	---
12	880	863	874	833	687	798				---	---	---
13	909	820	863	839	810	819				---	---	---
14	924	869	887	852	815	834				---	---	---
15	967	883	913	875	855	868				---	---	---
16	999	931	952	875	841	868				---	---	---
17	1210	995	1150	864	821	839				---	---	---
18	1230	1120	1160	868	844	859				---	---	---
19	1170	1050	1120	864	578	775				---	---	---
20	1150	1070	1120	---	---	---				915	703	776
21	1130	1010	1080	---	---	---				934	717	863
22	1130	1010	1080	---	---	---				961	885	917
23	1100	1000	1060	---	---	---				1020	947	987
24	1150	1040	1100	---	---	---				1050	1020	1030
25	1230	1130	1180	---	---	---				1050	978	1020
26	1240	1100	1180	---	---	---				---	---	---
27	1240	1140	1200	---	---	---				700	681	686
28	1260	1150	1210	---	---	---				782	693	754
29	1250	1050	1140	---	---	---				770	735	749
30	1130	1020	1050	---	---	---				734	718	730
31	---	---	---	---	---	---				---	---	---
MONTH	1260	600	1000	1090	559	817				1050	681	851

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	16.5	15.5	16.0	10.5	5.5	7.5	0.0	0.0	0.0	0.0	0.0	0.0
2	16.5	15.5	16.5	6.5	5.5	6.0	0.0	0.0	0.0	0.0	0.0	0.0
3	17.0	16.0	16.5	6.5	6.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0
4	18.0	16.5	17.5	6.0	5.5	6.0	0.0	0.0	0.0	0.0	0.0	0.0
5	18.5	17.5	18.0	5.5	5.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0
6	18.5	15.0	17.5	6.0	5.0	5.5	1.0	0.0	0.5	0.0	0.0	0.0
7	15.5	13.5	14.0	5.5	5.0	5.5	0.5	0.0	0.5	0.0	0.0	0.0
8	13.5	12.5	13.0	4.5	2.5	3.5	0.5	0.0	0.0	0.0	0.0	0.0
9	12.5	12.0	12.0	3.5	2.5	3.0	0.5	0.0	0.0	0.0	0.0	0.0
10	12.0	11.0	11.5	4.5	3.0	3.5	1.0	0.0	0.5	0.0	0.0	0.0
11	13.5	11.5	12.5	4.0	3.0	3.5	0.5	0.5	0.5	0.0	0.0	0.0
12	14.0	13.0	13.5	3.0	2.5	2.5	0.5	0.0	0.5	0.0	0.0	0.0
13	15.0	14.0	14.5	3.5	2.5	3.0	0.0	0.0	0.0	0.0	0.0	0.0
14	14.0	12.5	13.0	3.0	2.5	2.5	0.5	0.0	0.0	0.0	0.0	0.0
15	---	---	---	3.0	2.0	2.5	1.0	0.0	0.5	0.0	0.0	0.0
16	---	---	---	3.0	1.5	2.5	1.0	0.0	0.5	0.0	0.0	0.0
17	---	---	---	3.0	2.0	2.5	0.5	0.5	0.5	0.0	0.0	0.0
18	---	---	---	4.0	2.5	3.0	2.0	0.5	1.5	0.0	0.0	0.0
19	---	---	---	4.5	3.0	4.0	2.0	1.0	1.5	0.0	0.0	0.0
20	---	---	---	4.5	3.5	4.0	3.0	2.0	2.5	0.0	0.0	0.0
21	9.0	8.0	8.5	4.0	2.5	3.5	2.0	0.0	0.5	0.0	0.0	0.0
22	8.0	6.5	7.0	2.5	1.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0
23	6.5	5.5	6.0	1.5	1.0	1.5	0.0	0.0	0.0	0.5	0.0	0.0
24	9.0	6.5	8.0	1.5	1.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0
25	9.0	8.0	8.5	2.5	1.5	2.0	0.0	0.0	0.0	0.0	0.0	0.0
26	8.0	6.5	7.5	7.0	2.5	4.5	0.0	0.0	0.0	0.0	0.0	0.0
27	6.5	5.5	6.0	8.5	6.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0
28	5.5	4.5	5.0	6.0	2.5	4.5	0.0	0.0	0.0	0.0	0.0	0.0
29	6.0	4.5	5.0	2.5	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
30	6.5	6.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	8.5	6.5	7.5	---	---	---	0.5	0.0	0.0	0.0	0.0	0.0
MONTH	18.5	4.5	11.0	18.5	0.0	3.5	3.0	0.0	0.5	0.5	0.0	0.0

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	0.0	0.0	0.0	0.5	0.0	0.0	10.0	7.5	9.0	15.5	13.5	15.0
2	0.0	0.0	0.0	0.5	0.0	0.0	11.0	7.0	8.0	16.0	14.5	15.0
3	0.0	0.0	0.0	0.5	0.0	0.5	11.5	9.5	10.0	15.5	13.5	14.0
4	0.0	0.0	0.0	1.0	0.0	0.5	9.5	7.5	8.0	16.0	13.0	14.0
5	0.0	0.0	0.0	1.0	0.0	0.0	7.5	6.0	7.0	18.5	15.5	17.0
6	0.0	0.0	0.0	0.0	0.0	0.0	6.0	5.0	5.5	18.0	14.5	16.5
7	0.0	0.0	0.0	0.0	0.0	0.0	5.5	3.5	4.5	16.5	13.5	15.0
8	0.0	0.0	0.0	0.5	0.0	0.5	6.0	3.5	5.0	15.0	11.5	13.0
9	0.0	0.0	0.0	1.5	0.5	1.0	7.5	5.0	6.0	15.0	12.5	13.5
10	0.0	0.0	0.0	3.5	1.0	2.5	9.5	7.0	8.0	16.0	15.0	15.5
11	1.5	0.0	0.5	6.0	3.0	4.5	13.5	9.5	11.5	---	---	---
12	2.5	0.5	1.0	7.0	6.0	6.0	15.5	13.0	14.5	15.5	14.5	15.0
13	2.5	0.5	1.5	7.0	6.5	7.0	16.5	15.0	15.5	17.5	14.5	16.5
14	0.5	0.0	0.5	7.5	7.0	7.5	16.0	14.0	15.0	19.0	16.5	17.0
15	0.0	0.0	0.0	9.0	7.0	8.0	15.0	12.5	14.0	21.5	17.0	19.5
16	0.0	0.0	0.0	9.0	7.5	8.5	13.5	13.0	13.5	21.0	15.0	17.0
17	0.5	0.0	0.0	7.5	6.5	7.0	13.5	12.0	13.0	15.5	14.5	15.0
18	0.5	0.0	0.0	6.0	3.0	4.5	15.0	12.5	14.0	16.5	15.0	16.0
19	1.5	0.0	0.5	5.5	2.5	3.5	16.0	14.0	15.0	17.5	15.5	16.5
20	0.5	0.0	0.0	5.0	3.5	4.0	18.0	15.5	16.5	16.5	14.5	15.5
21	0.0	0.0	0.0	5.0	3.0	4.0	18.0	16.5	17.5	15.5	14.5	15.0
22	1.5	0.0	0.5	5.0	4.0	4.5	18.0	14.0	16.5	---	---	---
23	1.5	0.5	1.0	4.5	3.0	3.5	14.0	11.0	12.0	---	---	---
24	1.5	0.0	0.5	3.5	1.5	2.5	11.5	10.0	11.0	---	---	---
25	0.0	0.0	0.0	5.0	2.0	3.5	11.5	11.0	11.0	---	---	---
26	0.0	0.0	0.0	6.0	3.5	5.0	11.5	10.0	11.0	---	---	---
27	0.5	0.0	0.0	7.0	5.0	6.0	13.5	11.5	12.5	---	---	---
28	0.0	0.0	0.0	9.0	7.0	8.0	13.5	11.0	12.5	---	---	---
29	---	---	---	12.0	9.0	10.5	12.0	9.5	11.0	---	---	---
30	---	---	---	13.5	11.5	12.5	14.0	11.0	13.0	---	---	---
31	---	---	---	13.0	10.0	11.5	---	---	---	---	---	---
MONTH	2.5	0.0	0.0	13.5	0.0	4.5	18.0	3.5	11.5	21.5	11.5	15.5
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	---	---	---	24.5	23.0	24.0	25.0	24.0	24.5
2	---	---	---	---	---	---	23.5	22.5	23.5	25.0	24.0	24.5
3	17.5	14.0	15.5	---	---	---	23.5	22.5	23.0	25.0	23.0	24.0
4	19.5	16.5	17.5	---	---	---	25.0	22.5	23.5	23.5	22.0	22.5
5	20.0	18.5	19.0	26.0	23.0	24.5	25.5	23.5	24.5	23.0	22.0	22.5
6	18.5	16.5	17.5	27.0	24.5	26.0	26.0	24.0	24.5	22.5	21.0	22.0
7	17.0	14.5	16.0	27.0	24.5	26.5	25.0	23.5	24.5	22.0	21.5	22.0
8	16.5	14.5	15.5	26.0	22.5	25.0	25.0	24.5	25.0	22.0	21.5	22.0
9	16.5	14.0	15.5	24.0	21.5	22.5	25.0	24.0	24.5	22.5	21.5	22.0
10	18.0	15.5	16.5	23.5	21.5	23.0	25.0	24.0	24.5	22.5	20.0	21.5
11	18.5	16.5	17.5	23.0	22.0	22.5	25.0	23.5	24.0	20.0	18.0	19.0
12	16.5	16.5	16.5	23.0	22.0	22.5	23.5	21.5	22.5	19.5	18.5	18.5
13	18.0	15.5	16.5	25.0	22.5	23.5	23.5	22.0	23.0	19.0	18.5	18.5
14	19.5	17.0	18.0	26.0	23.0	24.5	24.5	23.0	24.0	19.0	17.5	18.0
15	21.5	18.0	19.5	27.5	24.5	26.0	24.0	22.5	23.5	18.5	17.5	18.0
16	22.0	20.0	21.0	27.5	25.0	26.0	23.5	23.0	23.5	19.0	17.5	18.0
17	22.0	19.0	19.5	26.0	24.5	25.0	23.5	22.0	23.0	20.5	19.0	19.5
18	18.5	15.5	17.0	26.0	25.0	25.5	22.5	20.5	21.5	21.5	20.5	21.0
19	16.5	12.0	13.5	26.0	24.0	25.0	21.0	19.5	20.5	21.0	19.5	20.0
20	17.0	14.0	16.0	28.5	25.5	26.5	20.5	19.0	20.0	20.0	18.5	19.0
21	18.0	17.0	17.0	28.5	24.0	26.0	21.0	20.0	20.5	18.5	17.5	18.0
22	18.0	17.0	17.5	26.5	23.5	25.0	21.5	19.0	20.0	17.5	16.5	17.0
23	17.0	16.5	17.0	25.0	23.0	24.0	22.0	21.0	21.5	17.5	16.5	17.0
24	18.5	17.0	18.0	25.0	23.0	24.0	21.5	19.5	21.0	16.5	14.5	15.0
25	18.0	17.0	17.5	25.0	22.5	23.5	22.0	19.0	20.5	---	---	---
26	17.0	16.5	17.0	24.5	21.5	22.5	22.0	20.0	21.0	---	---	---
27	17.0	16.5	17.0	23.0	21.5	22.5	24.0	22.0	23.0	---	---	---
28	17.5	16.5	17.0	23.0	22.5	22.5	25.5	24.0	25.0	17.0	16.0	16.5
29	---	---	---	23.0	22.5	22.5	25.5	24.0	25.0	16.5	15.5	16.0
30	---	---	---	24.0	22.5	23.0	24.0	22.5	23.5	16.0	15.5	16.0
31	---	---	---	24.5	23.5	24.0	24.0	22.5	23.5	---	---	---
MONTH	22.0	12.0	17.0	28.5	21.5	24.0	26.0	19.0	23.0	25.0	14.5	19.5

04165700 DETROIT RIVER AT DETROIT, MI
(National stream-quality accounting network station)

LOCATION.--Lat 42°20'50", long 82°57'31", in T.2 S., R.13 E., Wayne County, at Detroit municipal raw-water intake at Water Works Park at Detroit.

DRAINAGE AREA.--228,800 mi² (592,600 km²), approximately.

PERIOD OF RECORD.--Water years 1970 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1974 to current year.
WATER TEMPERATURES: October 1973 to current year.

REMARKS.--Primary sampling point is raw water tap at Detroit municipal treatment facility. Facility intake is in lagoon at north end of Belle Isle in the Detroit River. Sampling point for June was at entrance of lagoon. Daily temperature values are the mean of three daily measurements. Daily mean water discharges were obtained from the National Oceanic and Atmospheric Administration and are reported for sampling times.

COOPERATION.--Daily mean temperature and specific conductance records provided by treatment facility personnel.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 300 micromhos Mar. 9, 1976; minimum daily, 194 micromhos, July 24, 1976.
WATER TEMPERATURES: Maximum daily mean, 24.5°C July 21, 1977; minimum daily mean, 0.5°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 243 micromhos Jan. 10; minimum daily, 195 micromhos Oct. 23, 24.
WATER TEMPERATURES: Maximum daily mean, 24.5°C July 21; minimum daily mean, 0.5°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	DIS-CHARGE (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE (DEG C)	DIS-SOLVED OXYGEN (MG/L)	PER-CENT SATUR-ATION	IMME-DIATE COLI-FORM (COL. PER 100 ML)	FECAL COLI-FORM .7UM-MF (COL./ 100 ML)	FECAL STREP-TOCOCCI KF AGAR (COL. PER 100 ML)	HARD-NESS (CA,MG) (MG/L)	NON-CAR-BONATE HARD-NESS (MG/L)
OCT												
14...	1430	216000	206	7.9	--	9.7	97	B12	84	84	--	--
NOV												
17...	1415	202000	217	7.7	--	11.9	101	B11	85	32	95	13
DEC												
15...	1430	208000	212	7.5	--	13.3	103	<1	<1	<1	99	17
JAN												
25...	1445	206000	217	7.7	--	15.6	110	B3	B2	B2	93	11
FEB												
17...	1330	216000	206	7.7	--	10.6	71	<1	<1	1	96	14
MAR												
16...	1030	226000	206	7.3	--	12.6	97	B4	<1	13	90	8
APR												
13...	1400	195000	217	7.8	--	13.3	116	B5	<1	B1	100	18
MAY												
11...	1445	192000	209	7.6	11.0	10.7	101	34	1	<1	100	18
JUN												
01...	1400	216000	213	7.8	17.0	--	--	120	B2	B1	100	18
JUL												
08...	1100	189000	209	8.0	21.0	10.2	116	>160	B3	64	100	18
AUG												
10...	1430	191000	201	7.9	22.4	--	--	4200	836	B6	99	17
SEP												
19...	1400	188000	207	8.3	19.0	8.5	94	160	10	20	96	14

DATE	DIS-SOLVED CAL-CIUM (CA) (MG/L)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L)	DIS-SOLVED SODIUM (NA) (MG/L)	SODIUM AD-SORP-TION RATIO	DIS-SOLVED PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)	ALKA-LINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DIS-SOLVED SULFATE (SO4) (MG/L)	DIS-SOLVED CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)
OCT												
14...	--	6.9	3.9	--	.9	100	0	82	2.0	16	7.6	.1
NOV												
17...	27	6.8	4.2	.2	.9	100	0	82	3.2	15	8.0	.1
DEC												
15...	28	7.0	4.1	.2	.8	100	0	82	5.1	15	7.8	.1
JAN												
25...	27	6.1	4.6	.2	.9	100	0	82	3.2	15	8.3	.1
FEB												
17...	26	7.5	4.6	.2	.9	100	0	82	3.2	14	8.9	.1
MAR												
16...	25	6.8	4.8	.2	1.0	100	0	82	8.0	16	9.6	.1
APR												
13...	27	8.0	3.7	.2	.9	100	0	82	2.5	14	9.0	.1
MAY												
11...	28	7.3	4.2	.2	1.0	100	0	82	4.0	15	6.9	.0
JUN												
01...	29	7.5	4.6	.2	1.0	100	0	82	2.5	16	7.3	.1
JUL												
08...	28	7.2	4.5	.2	.9	100	0	82	1.6	16	7.3	.1
AUG												
10...	28	7.1	4.4	.2	.9	100	0	82	2.0	16	6.7	.1
SEP												
19...	27	7.0	4.4	.2	1.0	100	0	82	.8	16	7.0	.1

B--RESULTS BASED ON COLONY COUNT OUTSIDE THE ACCEPTABLE RANGE (NON-IDEAL COLONY COUNT)

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER DAY)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)
OCT								
14...	.6	116	--	67700	.22	.37	1.6	.02
NOV								
17...	.5	111	112	60500	.22	.35	1.6	.02
DEC								
15...	.6	113	113	63500	.25	.35	1.6	.03
JAN								
25...	.9	118	112	65600	.28	--	--	.03
FEB								
17...	.9	113	112	65900	.31	.40	1.8	.02
MAR								
16...	1.6	121	114	73800	.34	.54	2.4	.03
APR								
13...	1.0	116	113	61100	.32	.52	2.3	.03
MAY								
11...	1.1	134	113	69500	.25	.51	2.3	.01
JUN								
01...	.8	113	116	65900	.29	.44	1.9	.01
JUL								
08...	.9	139	114	70400	.21	.38	1.7	.01
AUG								
10...	1.1	135	114	69600	.23	.43	1.9	.01
SEP								
19...	1.0	114	113	57900	.21	--	--	.01

DATE	TIME	TOTAL ARSENIC (AS) (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	TOTAL CAD-MIUM (CD) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	TOTAL CHRO-MIUM (CR) (UG/L)	DIS-SOLVED CHRO-MIUM (CR) (UG/L)	TOTAL COBALT (CO) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)	TOTAL IRON (FE) (UG/L)
OCT												
14...	1430	1	0	0	0	<10	<10	0	0	10	0	370
JAN												
25...	1445	1	0	2	1	<10	10	0	0	0	0	20
APR												
13...	1400	0	0	1	0	10	<10	0	0	10	0	190
JUL												
08...	1100	2	2	0	0	<10	8	0	0	6	2	--

DATE	DIS-SOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	TOTAL MAN-GANESE (MN) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	TOTAL SELE-NIUM (SE) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	TOTAL ZINC (ZN) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	TOTAL ORGANIC CARBON (C) (MG/L)
OCT												
14...	0	5	5	10	10	<.5	<.5	0	0	0	0	4.2
JAN												
25...	20	16	5	0	0	<.5	<.5	0	0	10	10	6.9
APR												
13...	50	8	1	10	0	<.5	<.5	1	0	--	20	--
JUL												
08...	0	12	9	20	10	.0	.0	0	0	10	10	5.1

04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	OCT 14,76		DEC 15,76		JAN 25,77		FEB 17,77		MAY 11,77	
TIME	1430		1430		1445		1330		1445	
TOTAL CELLS/ML	2700		1300		780		640		1000	
DIVERSITY: DIVISION	1.5		1.2		1.3		1.6		1.3	
.CLASS	1.8		1.2		1.3		2.0		1.6	
..ORDER	2.1		2.1		2.1		2.5		1.9	
...FAMILY	2.5		2.2		2.4		2.9		2.6	
....GENUS	2.7		2.5		2.4		3.2		2.7	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	25	3	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	57	2	--	-	*	0	3	1	32	3
....CHLORELLA	--	-	--	-	13	2	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	230	8	22	2	6	1	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	3	1	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	44	3	--	-	--	-	--	-
....SCENEDESMUS	400	15	*	0	13	2	--	-	18	2
....TETRASTRUM	--	-	--	-	--	-	--	-	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	*	0	--	-	23	4	--	-
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	--	-	*	0	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	--	-	--	-	--	-	3	1	--	-
....COSMARIUM	--	-	--	-	--	-	--	-	--	*
...ZYGNEMATACEAE										
....MOUGEOTIA	--	-	--	-	--	-	--	-	--	*
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	890#	33	160	12	--	-	45	7	37	4
....MELOSIRA	110	4	--	-	130#	17	23	4	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-	*	0
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	29	1	--	-	--	-	--	-	*	0
....COCCONEIS	--	-	--	-	*	0	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	*	0	--	-	--	-	9	1
....CYMBELLA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	94	7	--	-	39	6	23	2
....FRAGILARIA	86	3	180	14	78	10	58	9	64	6
....SYNEDRA	--	-	--	-	--	-	--	-	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	--	-	3	1	--	-
...NAVICULACEAE										
....NAVICULA	--	-	--	-	--	-	--	-	9	1
....NEIDIUM	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	86	3	*	0	47	6	13	2	190#	19
...SURIRELLACEAE										
....CYMATOPLEURA	--	-	--	-	--	-	--	-	--	-
...TABELLARIACEAE										
....TABELLARIA	--	-	13	1	--	-	32	5	69	7
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	260	9	--	-	--	-	*	0	87	9
....OCHROMONAS	--	-	--	-	--	-	68	11	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	OCT 14,76 1430		DEC 15,76 1430		JAN 25,77 1445		FEB 17,77 1330		MAY 11,77 1445	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROCOCCALES										
...CHROCOCCACEAE										
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	570#	21	280#	22	72	9	23	4	18	2
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....LYNGBYA	--	-	*	0	--	-	--	-	--	-
....OSCILLATORIA	--	-	470#	37	380#	49	230#	36	420#	42
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-
..CHROCOCCALES										
...CHROCOCCACEAE										
....GOMPHOSPHAERIA	--	-	*	0	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.CRYPTOPHYCEAE										
..CRYPTOMONIDALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	6	1	61	10	--	-
...CRYPTOMONODACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	13	2	--	-
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....LEPOCINCLIS	--	-	--	-	--	-	3	1	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...CERATIACEAE										
....CERATIUM	--	-	--	-	--	-	--	-	--	-
...PERIDINIACEAE										
....PERIDINIUM	--	-	--	-	--	-	--	-	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 1,77		JUL 8,77		AUG 10,77		SEP 19,77	
TIME	1400		1100		1430		1400	
TOTAL CELLS/ML	1900		12000		1400		1400	
DIVERSITY: DIVISION	1.0		0.3		1.2		1.5	
.CLASS	1.8		0.3		1.2		1.5	
..ORDER	2.0		0.5		2.1		2.2	
...FAMILY	2.6		0.7		2.5		2.6	
....GENUS	2.8		0.8		3.0		2.8	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	*	0	12	1
...COELASTRACEAE								
....COELASTRUM	*	0	*	0	--	-	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	*	0	--	-	--	-	--	-
...MICRACTINIACEAE								
....GOLENKINIA	*	0	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	74	4	*	0	*	0	--	-
....CHLORELLA	--	-	--	-	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	12	1
....DICTYOSPHAERIUM	--	-	--	-	200	14	--	-
....OOCYSTIS	--	-	160	1	53	4	37	3
....SELENASTRUM	--	-	*	0	--	-	--	-
....TETRAEDRON	12	1	--	-	--	-	24	2
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	49	3	*	0	53	4	12	1
....TETRASTRUM	--	-	--	-	18	1	--	-
..TETRASPORALES								
...COCCOMYXACEAE								
....FLAKATOTHRIX	--	-	--	-	--	-	--	-
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	150	11	150	11
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	*	0	--	-	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....CLOSTERIUM	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	13	1	12	1
...ZYGNEMATACEAE								
....MOUGEOTIA	*	0	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	25	1	*	0	--	-	200	14
....MELOSIRA	--	-	--	-	9	1	--	-
....STEPHANODISCUS	110	6	--	-	--	-	24	2
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	13	1	49	4
...CYMBELLACEAE								
....AMPHORA	--	-	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	--	-	12	1
...DIATOMACEAE								
....DIATOMA	120	6	--	-	--	-	12	1
...FRAGILARIACEAE								
....ASTERIONELLA	49	3	78	1	--	-	--	-
....FRAGILARIA	280	15	*	0	44	3	--	-
....SYNEDRA	37	2	--	-	9	1	12	1
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	12	1
...NAVICULACEAE								
....NAVICULA	*	0	--	-	--	-	--	-
....NEIDIUM	*	0	--	-	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	74	4	--	-	--	-	12	1
...SURIRELLACEAE								
....CYMATOPLEURA	--	-	*	0	--	-	--	-
...TABELLARIACEAE								
....TABELLARIA	37	2	--	-	--	-	49	4
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...OCHROMONADACEAE								
....DINOBRYON	790#	41	*	0	*	0	--	-
....OCHROMONAS	--	-	120	1	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUN 1,77 1400		JUL 8,77 1100		AUG 10,77 1430		SEP 19,77 1400	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROCOCCALES								
...CHROCOCCACEAE								
....AGMENELLUM								
....ANACYSTIS	--	-	230	2	110	8	--	-
..HORMOGONALES	--	-	--	-	520#	37	650#	48
...NOSTOCACEAE								
....ANABAENA								
...OSCILLATORIACEAE	--	-	--	-	110	8	--	-
....LYNGBYA	--	-	--	-	--	-	--	-
....OSCILLATORIA	270	14	11000#	90	88	6	61	5
...RIVULARIACEAE								
....RAPHIDIOPSIS	--	-	550	4	--	-	--	-
..CHROCOCCALES								
...CHROCOCCACEAE								
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.CRYPTOPHYCEAE								
..CRYPTOMONIDALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	12	1	*	0	--	-	--	-
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....LEPOCINCLIS	--	-	--	-	--	-	--	-
....TRACHELOMONAS	*	0	--	-	--	-	12	1
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...CERATIACEAE								
....CERATIUM	--	-	*	0	--	-	--	-
...PERIDINIACEAE								
....PERIDINIUM	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

PERIPHYTON

DATE	LENGTH OF EXPOSURE (DAYS)	BIOMASS CHLOROPHYLL RATIO PERIPHYTON (UNITS)	PERIPHYTON BIOMASS ASH WEIGHT G/SQ M	PERIPHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)	CHLOR-B PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)
NOV 17...	41	2852	.000	.077	.029	.084
AUG 10...	33	183300	22.0	25.3	.018	.000

04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
ONCE-DAILY MEASUREMENT BETWEEN 0800 AND 0900 HOURS

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	204	211	214	216	221	218	224	210	216	210	214	212
2	210	209	219	218	220	210	220	206	226	206	215	220
3	213	208	200	218	235	212	232	210	210	208	210	222
4	212	217	200	218	216	206	230	211	210	210	211	214
5	205	198	200	222	218	206	222	210	215	215	214	212
6	211	203	210	220	220	208	223	214	215	211	222	210
7	212	203	214	222	210	209	224	221	208	200	214	204
8	212	198	214	219	220	206	210	215	206	214	208	204
9	214	197	208	220	218	206	240	208	212	214	211	205
10	208	197	218	243	218	216	225	217	204	211	212	206
11	214	197	226	238	220	235	220	215	204	217	205	209
12	210	218	228	229	220	229	210	217	214	214	213	217
13	208	210	222	229	216	218	210	216	214	214	214	219
14	210	207	215	215	226	206	214	214	215	204	211	214
15	217	217	223	204	226	200	228	214	214	208	208	212
16	221	217	218	215	218	198	230	214	214	209	211	209
17	220	213	208	224	214	208	229	230	207	214	214	212
18	228	217	215	200	214	213	217	214	205	220	225	215
19	217	200	200	210	227	217	216	214	207	218	212	213
20	212	200	203	228	229	232	213	215	205	218	214	212
21	217	209	205	238	218	222	233	214	207	214	214	206
22	205	200	205	225	230	224	211	226	208	214	204	204
23	195	200	212	225	227	239	222	228	207	211	206	206
24	195	200	216	239	225	239	230	212	220	213	204	205
25	200	200	208	224	219	234	224	233	214	214	207	210
26	204	208	224	227	222	226	228	228	214	210	208	212
27	200	219	226	229	218	221	218	227	219	215	204	204
28	205	216	219	228	208	233	214	225	214	214	206	204
29	211	210	218	228	---	234	210	221	214	210	204	206
30	208	208	228	224	---	232	210	226	217	210	204	205
31	211	---	216	228	---	218	---	224	---	224	203	---

TEMPERATURE (DEG. C) OF WATER, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15.5	7.0	2.0	0.5	0.5	0.5	6.0	9.5	18.0	19.5	23.0	23.0
2	15.5	7.0	1.5	0.5	0.5	0.5	6.0	10.0	16.5	20.0	22.0	23.0
3	15.5	7.0	1.0	0.5	0.5	0.5	6.5	10.0	15.5	20.0	22.0	23.0
4	16.0	6.5	0.5	0.5	0.5	0.5	6.5	10.0	16.0	20.0	22.0	22.0
5	16.5	6.5	0.5	0.5	0.5	0.5	5.5	10.5	16.5	20.5	23.0	22.0
6	17.0	7.0	0.5	0.5	0.5	0.5	5.0	11.0	17.0	21.5	23.0	21.5
7	16.0	7.0	0.5	0.5	0.5	0.5	4.0	11.5	16.0	21.5	23.0	22.0
8	15.0	6.5	0.5	0.5	0.5	0.5	4.0	11.0	15.5	21.0	23.0	21.5
9	15.0	6.0	0.5	0.5	0.5	1.0	4.0	11.0	15.0	21.5	23.0	21.5
10	14.0	5.5	0.5	0.5	0.5	1.0	4.0	10.5	15.5	21.5	23.0	21.5
11	13.0	5.0	0.5	0.5	0.5	1.0	4.5	10.5	15.5	22.0	23.0	20.5
12	13.0	5.0	0.5	0.5	0.5	1.0	5.5	11.5	15.5	23.0	22.0	20.0
13	13.0	4.5	0.5	0.5	0.5	0.5	6.0	11.0	15.5	23.0	22.0	19.5
14	13.0	4.5	0.5	0.5	0.5	0.5	7.0	12.0	16.0	22.0	22.0	19.5
15	13.0	4.0	0.5	0.5	0.5	0.5	8.0	13.0	16.5	23.5	22.0	19.0
16	12.0	4.0	0.5	0.5	0.5	1.5	8.5	13.5	18.0	23.5	22.0	18.5
17	11.5	4.0	0.5	0.5	0.5	1.5	8.5	14.0	18.5	23.5	22.0	18.5
18	11.0	4.0	0.5	0.5	0.5	1.0	9.0	14.5	18.5	23.5	21.0	19.0
19	10.5	4.0	0.5	0.5	0.5	1.0	9.0	15.0	19.0	24.0	21.0	19.0
20	10.0	4.0	0.5	0.5	0.5	2.0	9.0	15.0	19.0	24.0	20.5	19.0
21	9.5	4.5	0.5	0.5	0.5	2.0	9.0	16.5	19.0	24.5	20.5	19.0
22	9.0	4.0	0.5	0.5	0.5	2.0	9.5	17.0	19.5	24.0	20.0	18.5
23	9.0	4.0	0.5	0.5	0.5	2.0	9.5	18.0	20.5	24.0	20.0	18.0
24	8.5	4.0	0.5	0.5	0.5	2.0	9.5	17.0	20.5	23.5	20.0	18.0
25	8.5	3.5	0.5	0.5	0.5	2.0	9.5	18.0	20.5	23.5	20.0	18.0
26	7.0	3.5	0.5	0.5	0.5	2.0	9.0	18.5	20.5	23.0	20.0	18.0
27	8.0	3.5	0.5	0.5	0.5	3.0	9.0	18.5	21.0	22.0	20.5	17.0
28	8.0	3.5	0.5	0.5	0.5	3.5	8.5	19.0	21.5	22.0	21.0	17.0
29	7.0	3.5	0.5	0.5	---	4.0	8.0	19.0	21.5	22.0	21.5	17.0
30	7.0	2.0	0.5	0.5	---	5.0	8.5	18.5	20.5	22.0	21.5	17.0
31	7.0	---	0.5	0.5	---	5.0	---	18.5	---	23.0	22.0	---

04166000 RIVER ROUGE AT BIRMINGHAM, MI

LOCATION.--Lat 42°32'45", long 83°13'25", in NW¼ sec.36, T.2 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on left bank 25 ft (8 m) downstream from mouth of Quarton Lake outlet, and 100 ft (30 m) upstream from bridge on Maple Road, in Birmingham.

DRAINAGE AREA.--33.3 mi² (86.2 km²). Prior to water year 1971, drainage area was 36.9 mi² (95.6 km²). An area of 3.6 mi² (9.3 km²) noncontributing since then.

PERIOD OF RECORD.--June 1950 to current year.

REVISED RECORDS.--WSP 1387: 1951-52(M). WSP 1557: Drainage area.

GAGE.--Water-stage recorder. Concrete control since July 27, 1962. Datum of gage is 715.94 ft (218.219 m) above mean sea level.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by Quarton Lake above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years (water years 1951-70), 15.3 ft³/s (0.433 m³/s), 5.63 in/yr (143 mm/yr); 7 years (water years 1971-77), 23.0 ft³/s (0.651 m³/s), 9.38 in/yr (238 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,390 ft³/s (39.4 m³/s) June 26, 1968, gage height, 8.70 ft (2.652 m); minimum, 0.10 ft³/s (0.003 m³/s) Aug. 8, 9, 1963; minimum gage height, 1.02 ft (0.311 m) Oct. 12, 1961.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 180 ft³/s (5.10 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 4	2100	218	6.17	3.44	1.049	Apr. 2	2300	*476	13.5	*4.77	1.454
Mar. 29	0300	248	7.02	3.62	1.103	Apr. 23	1900	211	5.98	3.40	1.036

Minimum discharge, 1.8 ft³/s (0.051 m³/s) Sept. 9, gage height, 1.49 ft (0.454 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.0	12	8.4	7.0	6.2	19	32	29	13	25	3.3	3.4
2	6.6	10	8.1	6.8	6.2	19	119	30	11	9.0	3.0	4.5
3	6.3	9.6	7.6	6.8	6.4	20	180	24	8.6	6.5	8.5	3.9
4	5.8	9.0	7.9	6.6	6.6	107	73	29	7.8	6.0	4.4	3.4
5	6.0	12	7.9	6.6	6.6	99	120	30	7.1	8.0	8.2	4.0
6	46	6.4	8.0	6.6	6.6	45	62	29	21	5.5	7.5	4.0
7	39	8.6	8.9	6.6	6.8	30	45	22	16	4.5	9.2	3.6
8	18	8.9	8.3	6.4	6.8	31	39	22	9.5	4.5	6.5	3.7
9	13	8.4	7.9	6.2	7.1	39	33	20	9.1	9.0	5.0	2.3
10	11	8.6	8.2	6.2	7.4	39	31	20	8.1	5.0	6.0	2.4
11	9.5	8.7	8.3	6.2	8.3	35	29	20	8.0	4.2	6.4	2.5
12	9.4	8.6	7.7	6.2	10	46	26	19	11	7.5	7.4	2.4
13	8.0	8.5	7.2	6.2	14	80	25	17	12	6.0	5.9	15
14	7.4	8.5	7.1	6.2	12	45	24	15	12	5.0	4.5	11
15	7.9	9.0	7.4	6.2	9.4	36	23	13	10	4.0	3.8	8.7
16	6.5	9.6	7.9	6.2	8.5	30	20	10	7.3	5.0	3.8	13
17	8.0	8.7	7.9	6.2	8.0	25	19	9.0	6.6	6.0	3.6	9.4
18	7.3	9.0	7.9	6.2	7.7	27	18	26	14	4.5	3.0	14
19	7.9	8.8	8.0	6.2	8.3	29	19	15	10	17	3.3	15
20	9.8	8.5	11	6.2	8.3	34	19	10	6.5	7.0	4.9	10
21	11	8.6	9.4	6.2	8.2	30	19	10	5.6	4.5	5.1	7.5
22	9.8	8.6	8.0	6.2	9.5	36	34	30	4.9	3.8	5.0	6.6
23	9.0	8.2	7.8	6.2	16	33	132	80	4.4	3.2	3.9	7.2
24	11	8.2	7.6	6.2	82	27	98	20	4.5	3.2	4.9	8.1
25	10	8.3	7.6	6.2	53	24	128	13	4.4	9.0	4.1	8.2
26	10	12	7.6	6.2	29	23	92	9.8	4.0	4.0	3.9	15
27	8.6	33	7.6	6.2	27	23	50	8.7	3.7	3.8	4.0	11
28	8.4	18	7.6	6.2	22	154	37	8.2	3.5	3.6	3.4	7.3
29	8.2	12	7.4	6.2	---	161	33	7.3	39	3.6	3.7	6.4
30	10	9.4	7.3	6.2	---	60	31	6.7	15	3.8	3.3	6.5
31	15	---	7.2	6.2	---	42	---	6.7	---	3.6	3.0	---
TOTAL	351.4	307.7	246.7	196.0	407.9	1448	1610	609.4	297.6	195.3	152.5	220.0
MEAN	11.3	10.3	7.96	6.32	14.6	46.7	53.7	19.7	9.92	6.30	4.92	7.33
MAX	46	33	11	7.0	82	161	180	80	39	25	9.2	15
MIN	5.8	6.4	7.1	6.2	6.2	19	18	6.7	3.5	3.2	3.0	2.3
CFSM	.34	.31	.24	.19	.44	1.40	1.61	.59	.30	.19	.15	.22
IN.	.39	.34	.28	.22	.46	1.62	1.80	.68	.33	.22	.17	.25

CAL YR 1976 TOTAL 10423.8 MEAN 28.5 MAX 300 MIN 3.4 CFSM .86 IN 11.64
WTR YR 1977 TOTAL 6042.5 MEAN 16.6 MAX 180 MIN 2.3 CFSM .50 IN 6.75

04166100 RIVER ROUGE AT SOUTHFIELD, MI

LOCATION.--Lat 42°26'52", long 83°17'52", in SW¼ sec.32, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on right bank at downstream side of bridge on Beech Road at Southfield, 4.2 mi (6.8 km) east of Farmington.

DRAINAGE AREA.--87.9 mi² (227.7 km²).

PERIOD OF RECORD.--April 1958 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 609.62 ft (185.812 m) above mean sea level (city of Southfield bench mark). Prior to Sept. 30, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 57.7 ft³/s (1.634 m³/s), 8.91 in/yr (226 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,900 ft³/s (139 m³/s) June 26, 1968, gage height, 19.04 ft (5.803 m); minimum, 0.1 ft³/s (0.003 m³/s) Aug. 2, 1964, gage height, 1.15 ft (0.351 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 500 ft³/s (14.2 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 24	1700	622	17.6	8.67	2.643	Apr. 5	1300	646	18.3	8.73	2.661
Mar. 5	0100	950	26.9	10.06	3.066	Apr. 24	0200	1,030	29.2	10.37	3.161
Mar. 29	0900	1,070	30.3	10.51	3.203	Apr. 25	1800	1,170	33.1	10.83	3.301
Apr. 3	0700	*1,440	40.8	*11.73	3.575	May 23	0400	626	17.7	8.63	2.630

Minimum discharge, 8.2 ft³/s (0.23 m³/s) Aug. 3, Sept. 11, 12, gage height, 2.52 ft (0.768 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	34	20	17	16	82	105	79	51	78	9.8	9.5
2	16	26	19	17	16	70	179	81	32	32	9.1	19
3	15	23	18	16	16	79	975	71	26	21	8.6	13
4	14	22	18	16	16	402	258	84	23	18	21	10
5	15	22	19	16	16	716	521	88	38	24	28	9.5
6	157	23	19	16	17	194	225	78	70	18	22	10
7	154	19	19	16	18	120	141	60	60	14	18	9.8
8	46	20	20	16	19	93	116	52	34	14	20	9.3
9	31	20	20	16	20	115	97	48	30	28	16	9.5
10	26	20	20	16	21	115	87	49	26	16	17	9.8
11	23	20	20	16	22	96	81	47	23	13	18	8.4
12	21	20	19	16	26	113	73	47	30	24	29	8.4
13	20	20	18	16	32	270	67	43	34	20	16	61
14	19	20	18	16	27	137	64	41	28	16	13	45
15	18	20	19	16	23	100	59	36	25	13	11	20
16	18	20	20	16	20	82	55	32	22	16	10	48
17	17	20	20	16	19	68	54	29	26	18	11	28
18	18	20	20	16	19	75	53	77	45	14	9.3	76
19	18	20	20	16	19	88	51	49	34	54	8.6	72
20	27	20	20	16	19	111	55	33	22	23	8.9	38
21	26	20	20	16	20	96	53	28	19	15	11	22
22	27	20	20	16	25	119	73	74	17	12	16	19
23	22	20	19	16	45	110	595	259	15	10	12	20
24	28	19	19	16	394	84	652	62	14	10	20	21
25	28	20	19	16	391	75	812	44	15	29	13	29
26	24	28	19	16	144	68	728	36	14	14	10	69
27	21	101	18	16	121	65	203	30	13	10	9.8	37
28	20	56	18	16	106	450	131	26	13	9.5	10	24
29	20	31	18	16	---	910	101	23	99	9.8	10	20
30	21	21	18	16	---	254	88	21	48	11	14	20
31	48	---	17	16	---	136	---	22	---	11	10	---
TOTAL	975	765	591	498	1647	5493	6752	1749	946	615.3	440.1	795.2
MEAN	31.5	25.5	19.1	16.1	58.8	177	225	56.4	31.5	19.8	14.2	26.5
MAX	157	101	20	17	394	910	975	259	99	78	29	76
MIN	14	19	17	16	16	65	51	21	13	9.5	8.6	8.4
CFSM	.36	.29	.22	.18	.67	2.01	2.56	.64	.36	.23	.16	.30
IN.	.41	.32	.25	.21	.70	2.32	2.86	.74	.40	.26	.19	.34

CAL YR 1976 TOTAL 31607.0 MEAN 86.4 MAX 1080 MIN 12 CFSM .98 IN 13.38
WTR YR 1977 TOTAL 21266.6 MEAN 58.3 MAX 975 MIN 8.4 CFSM .66 IN 9.00

04166200 EVANS DITCH AT SOUTHFIELD, MI

LOCATION.--Lat 42°27'28", long 83°16'03", in SE¼ sec.28, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on right bank 20 ft (6 m) upstream from bridge on Nine-Mile Road, at Southfield, 1.6 mi (2.6 km) upstream from mouth, and 5.5 mi (8.8 km) east of Farmington.

DRAINAGE AREA.--9.49 mi² (24.58 km²).

PERIOD OF RECORD.--September 1958 to current year.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 615.07 ft (187.473 m) above mean sea level (city of Southfield bench mark).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 8.25 ft³/s (0.234 m³/s), 11.81 in/yr (300 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 903 ft³/s (25.6 m³/s) June 25, 1968, gage height, 12.95 ft (3.947 m), from rating curve extended above 410 ft³/s (11.6 m³/s); minimum, 0.01 ft³/s (<0.001 m³/s) Oct. 3, 1967; minimum gage height, 5.08 ft (1.548 m) Sept 13, 1966.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 200 ft³/s (5.66 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Oct. 6	1500	203	5.75	7.50	2.286	Apr. 25	0900	425	12.0	9.35	2.850
Mar. 4	1800	253	7.16	7.92	2.414	May 22	2000	205	5.81	7.52	2.292
Mar. 28	1800	310	8.78	8.39	2.557	July 19	1000	261	7.39	7.98	2.432
Apr. 2	2100	*516	14.6	*10.07	3.069	Sept. 18	1700	306	8.67	8.36	2.548
Apr. 22	2300	280	7.93	8.14	2.481	Sept. 26	0900	275	7.79	8.10	2.469
Apr. 23	1600	324	9.18	8.51	2.594						

Minimum discharge, 0.48 ft³/s (0.014 m³/s) Nov. 8, 12, 13; minimum gage height, 5.39 ft (1.643 m) Oct. 2, 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.6	1.4	1.7	1.9	1.8	7.0	7.7	5.9	13	5.9	1.3	2.0
2	1.3	1.4	1.8	1.9	1.8	7.0	93	5.9	3.1	1.4	1.4	9.0
3	1.1	2.4	1.8	1.9	1.8	8.6	28	5.0	2.2	1.1	1.4	1.4
4	1.6	2.4	1.9	1.8	1.8	91	30	14	2.2	1.1	1.4	.80
5	2.9	1.8	1.9	1.8	1.8	17	27	8.0	10	8.6	19	.96
6	79	1.3	2.0	1.8	1.8	6.4	11	6.2	18	1.6	6.4	1.4
7	11	1.1	2.0	1.8	2.1	5.6	9.0	4.5	4.0	1.4	2.6	1.1
8	3.7	.64	1.9	1.8	2.1	7.1	7.0	4.5	3.1	2.4	8.0	.96
9	2.9	.80	2.1	1.8	2.2	7.7	6.1	4.2	2.2	15	2.2	.96
10	2.6	1.3	2.1	1.8	2.3	6.7	5.9	4.0	1.8	1.6	6.7	1.1
11	2.4	1.1	2.0	1.8	2.5	5.6	5.0	4.0	1.8	1.8	5.0	1.1
12	2.4	.80	1.8	1.8	2.8	18	4.8	3.5	6.7	4.0	7.7	1.4
13	1.4	.64	1.8	1.8	3.8	19	4.2	3.7	2.4	1.4	2.0	22
14	1.4	.96	1.8	1.8	3.1	9.3	3.7	3.5	2.0	1.4	1.8	5.9
15	1.4	.80	1.9	1.8	2.6	6.4	3.5	3.1	1.8	1.1	1.3	4.8
16	1.4	.96	2.0	1.8	2.4	5.3	3.7	3.1	2.2	12	1.4	11
17	1.6	2.4	2.0	1.8	2.2	5.9	3.5	4.8	7.7	2.2	1.4	2.2
18	2.4	.96	1.8	1.8	2.2	11	4.2	15	7.7	4.0	2.2	27
19	2.6	.96	1.6	1.8	2.2	14	2.9	3.3	2.2	28	1.3	11
20	4.8	1.1	4.8	1.8	2.3	13	5.3	2.6	2.4	3.5	1.1	4.0
21	4.5	1.1	1.4	1.8	2.5	12	4.0	2.4	2.0	2.2	3.7	2.9
22	2.4	1.1	1.4	1.8	3.0	16	29	17	2.0	1.8	4.0	1.6
23	1.6	1.3	1.9	1.8	6.0	10	172	6.2	2.4	1.6	2.9	3.3
24	5.3	1.4	2.1	1.8	45	7.4	24	3.3	2.2	4.2	10	5.9
25	2.2	1.3	2.1	1.8	12	6.4	258	3.1	2.6	11	1.3	2.6
26	1.6	9.7	2.1	1.8	7.0	6.2	32	2.9	2.4	2.4	.96	31
27	1.4	19	2.1	1.8	14	6.7	13	2.4	1.8	1.8	1.1	5.0
28	2.0	3.3	2.0	1.8	10	120	9.7	2.4	2.0	1.6	1.3	3.5
29	2.2	1.8	2.0	1.8	---	63	7.4	2.9	18	1.6	3.5	3.5
30	5.3	1.6	2.0	1.8	---	12	6.7	2.9	12	1.6	1.8	4.5
31	8.0	---	1.9	1.8	---	9.0	---	8.6	---	1.4	1.4	---
TOTAL	166.0	66.82	61.7	56.1	145.1	540.3	821.3	162.9	143.9	130.7	107.56	173.88
MEAN	5.35	2.23	1.99	1.81	5.18	17.4	27.4	5.25	4.80	4.22	3.47	5.80
MAX	79	19	4.8	1.9	45	120	258	17	18	28	19	31
MIN	1.1	.64	1.4	1.8	1.8	5.3	2.9	2.4	1.8	1.1	.96	.80
CFSM	.56	.24	.21	.19	.55	1.83	2.89	.55	.51	.45	.37	.61
IN.	.65	.26	.24	.22	.57	2.12	3.22	.64	.56	.51	.42	.68

CAL YR 1976 TOTAL 3999.72 MEAN 10.9 MAX 250 MIN .64 CFSM 1.15 IN 15.68
WTR YR 1977 TOTAL 2576.26 MEAN 7.06 MAX 258 MIN .64 CFSM .74 IN 10.10

04166300 UPPER RIVER ROUGE AT FARMINGTON, MI

LOCATION.--Lat 42°27'52", long 83°22'11", in NW¼ sec.27, T.1 N., R.9 E., Oakland County, Hydrologic Unit 04090004, on left bank 800 ft (244 m) downstream from bridge on Shiawassee Road at Farmington.

DRAINAGE AREA.--17.5 mi² (45.3 km²).

PERIOD OF RECORD.--March 1958 to current year.

REVISED RECORDS.--WSP 1912: 1959(M), 1960(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 690.4 ft (210.43 m) above mean sea level.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 11.3 ft³/s (0.320 m³/s), 8.77 in/yr (223 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft³/s (42.5 m³/s) June 25, 1968, gage height, 8.70 ft (2.652 m); minimum, 0.07 ft³/s (0.002 m³/s) Aug. 30, 1966, result of regulation; minimum daily, 0.32 ft³/s (0.009 m³/s) Aug. 10, 1964, Aug. 29, 1966.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 80 ft³/s (2.27 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Feb. 24	--	85	2.41	ice jam		Apr. 5	0400	117	3.31	4.02	1.225
Mar. 4	2000	192	5.44	4.46	1.359	Apr. 23	1900	172	4.87	4.35	1.326
Mar. 29	0400	144	4.08	4.18	1.274	Apr. 25	1100	224	6.34	4.64	1.414
Apr. 2	2400	*315	8.92	*5.11	1.558	May 22	2300	144	4.08	4.18	1.274

Minimum discharge not determined; minimum daily, 1.2 ft³/s (0.034 m³/s) Sept. 10, 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.5	6.1	4.3	3.6	3.3	13	20	18	5.8	15	1.6	1.5
2	2.5	5.4	4.1	3.6	3.3	10	71	17	5.1	6.1	1.6	2.7
3	2.3	5.1	4.0	3.5	3.4	10	154	15	4.2	4.2	1.5	2.1
4	2.3	4.8	4.0	3.5	3.4	102	59	20	3.6	3.6	1.8	1.6
5	2.1	5.1	4.0	3.5	3.4	69	89	18	6.4	4.5	6.7	1.5
6	22	5.4	4.0	3.5	3.4	21	46	15	13	3.4	4.8	1.5
7	16	5.4	4.0	3.5	3.5	15	30	12	7.8	3.1	3.1	1.5
8	7.4	5.4	4.0	3.4	3.6	16	24	9.8	6.1	4.2	3.1	1.3
9	5.4	5.4	4.0	3.3	3.8	23	20	9.0	5.8	3.1	2.9	1.3
10	4.8	5.4	4.0	3.3	4.1	23	18	9.0	5.1	2.5	3.6	1.2
11	5.1	5.1	4.0	3.3	4.4	18	16	8.2	5.1	2.1	3.4	1.2
12	4.5	5.1	4.0	3.3	5.1	22	14	7.8	6.4	5.8	3.9	1.3
13	4.2	5.1	4.0	3.3	6.8	40	12	7.0	6.1	5.5	2.5	10
14	4.2	5.1	4.0	3.3	6.0	21	11	6.7	5.1	2.9	2.3	6.1
15	4.5	4.8	4.0	3.3	5.3	15	10	6.1	4.5	2.1	2.0	4.2
16	3.6	4.8	4.0	3.3	4.7	13	10	5.8	3.6	2.7	2.0	7.0
17	3.6	4.8	4.1	3.3	4.3	10	10	6.4	5.8	2.9	2.0	4.8
18	3.6	4.8	4.2	3.3	4.2	11	9.8	14	9.8	3.4	1.6	10
19	3.1	4.8	4.5	3.3	4.2	12	9.4	9.8	5.8	8.6	1.5	7.0
20	3.9	4.8	5.6	3.3	4.3	16	10	6.7	3.9	3.9	1.6	4.2
21	4.2	4.8	4.9	3.3	4.5	15	9.8	5.8	3.1	2.5	2.1	3.1
22	4.2	4.8	4.3	3.3	6.0	18	22	46	2.9	2.0	2.9	3.1
23	3.6	4.8	4.1	3.3	20	16	108	52	2.9	2.0	2.3	3.1
24	5.4	4.8	3.9	3.3	60	13	80	15	2.9	2.5	3.6	4.8
25	4.8	4.8	3.8	3.3	35	12	166	9.0	2.9	4.5	2.5	5.5
26	4.2	4.8	3.7	3.3	22	12	108	7.4	2.7	2.3	2.0	16
27	3.6	4.8	3.6	3.3	20	13	52	6.4	2.3	2.0	1.8	6.7
28	3.4	4.8	7.4	3.3	18	91	34	5.5	2.1	1.8	1.6	4.5
29	3.4	4.8	6.7	3.3	---	101	26	4.8	26	1.8	2.0	4.5
30	3.9	4.7	6.1	3.3	---	42	21	4.2	12	2.1	2.3	4.5
31	8.2	---	3.6	3.3	---	29	---	4.5	---	2.1	1.6	---
TOTAL	156.5	150.6	134.9	104.0	270.0	842	1270.0	381.9	178.8	115.2	78.2	127.8
MEAN	5.05	5.02	4.35	3.35	9.64	27.2	42.3	12.3	5.96	3.72	2.52	4.26
MAX	22	6.1	7.4	3.6	60	102	166	52	26	15	6.7	16
MIN	2.1	4.7	3.6	3.3	3.3	10	9.4	4.2	2.1	1.8	1.5	1.2
CFSM	.29	.29	.25	.19	.55	1.55	2.42	.70	.34	.21	.14	.24
IN.	.33	.32	.29	.22	.57	1.79	2.70	.81	.38	.24	.17	.27

CAL YR 1976 TOTAL 5906.8 MEAN 16.1 MAX 197 MIN 1.6 CFSM .92 IN 12.56
WTR YR 1977 TOTAL 3809.9 MEAN 10.4 MAX 166 MIN 1.2 CFSM .59 IN 8.10

04166500 RIVER ROUGE AT DETROIT, MI

LOCATION.--Lat 42°22'20", long 83°15'20", in SW¼ sec.27, T.1 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 500 ft (152 m) upstream from bridge on Plymouth Road in Detroit, and 4 mi (6 km) upstream from Middle River Rouge.

DRAINAGE AREA.--187 mi² (484 km²).

PERIOD OF RECORD.--October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1034: 1933(M). WSP 1054: 1939, 1943, 1945(M). WSP 1437: 1931-32, 1934, 1936(M), 1937-38, 1944(M), 1945. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 584.00 ft (178.003 m) above mean sea level. Prior to Oct. 16, 1948, nonrecording gage at site 1 mi (2 km) downstream at datum 4.6 ft (1.4 m) lower.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--47 years, 113 ft³/s (3.200 m³/s), 8.21 in/yr (209 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,000 ft³/s (368 m³/s) Apr. 5, 1947; maximum gage height, 23.0 ft (7.01 m) Apr. 6, 1947, from floodmark, site and datum then in use; minimum discharge, 1.8 ft³/s (0.051 m³/s) Aug. 1, 2, 1964, gage height, 3.00 ft (0.914 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft³/s (34.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 5	0600	1,210	34.3	11.55	3.520	Apr. 24	0600	1,520	43.0	12.74	3.883
Mar. 29	1400	1,490	42.2	12.54	3.822	Apr. 26	0100	*2,440	69.1	*14.98	4.566
Apr. 3	1600	1,560	44.2	12.78	3.895						

Minimum discharge, 10 ft³/s (0.28 m³/s) Sept. 12, gage height, 3.80 ft (1.158 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	33	68	34	30	29	158	179	143	159	166	20	15
2	33	44	33	30	30	134	421	162	59	62	16	46
3	32	38	32	29	30	140	1430	122	50	39	15	33
4	27	34	32	29	31	562	634	179	41	34	27	19
5	29	35	33	29	31	990	763	175	104	92	87	16
6	344	37	33	28	32	284	397	134	206	39	89	17
7	358	32	33	28	32	177	228	112	127	29	41	16
8	94	31	34	28	33	158	185	95	66	33	53	13
9	58	34	35	28	34	185	156	86	58	125	46	14
10	48	32	35	28	37	198	141	82	48	35	60	15
11	55	33	34	28	39	171	128	79	43	30	50	14
12	42	32	34	28	44	194	116	75	53	51	76	12
13	32	32	32	28	56	426	107	72	66	42	38	186
14	29	33	32	28	47	246	99	67	47	32	26	132
15	29	30	33	28	41	178	92	64	42	24	21	52
16	28	36	35	28	37	146	88	57	38	45	19	112
17	25	33	36	28	34	122	89	55	44	39	18	80
18	28	34	36	28	34	132	84	295	90	28	16	140
19	29	35	36	28	34	166	83	108	64	190	14	304
20	48	34	36	28	35	208	95	69	40	68	14	139
21	45	33	35	28	36	180	92	56	32	34	19	54
22	49	33	35	28	45	214	161	122	29	27	44	41
23	35	34	34	28	90	210	920	890	25	21	25	41
24	56	30	34	28	668	155	1240	139	25	29	86	55
25	53	32	33	28	777	132	1650	90	25	212	31	62
26	38	59	33	28	263	121	1910	70	24	43	21	435
27	36	191	32	28	252	118	498	60	24	25	18	105
28	31	115	32	28	211	698	242	52	22	20	16	54
29	37	61	31	28	---	1380	182	47	227	19	18	42
30	69	38	31	29	---	554	154	43	128	21	25	40
31	131	---	30	29	---	229	---	45	---	22	19	---
TOTAL	1981	1343	1038	877	3062	8966	12564	3845	2006	1676	1068	2304
MEAN	63.9	44.8	33.5	28.3	109	289	419	124	66.9	54.1	34.5	76.8
MAX	358	191	36	30	777	1380	1910	890	227	212	89	435
MIN	25	30	30	28	29	118	83	43	22	19	14	12
CFSM	.34	.24	.18	.15	.58	1.55	2.24	.66	.36	.29	.18	.41
IN.	.39	.27	.21	.17	.61	1.78	2.50	.76	.40	.33	.21	.46

CAL YR 1976 TOTAL 60922 MEAN 166 MAX 2720 MIN 25 CFSM .89 IN 12.12
WTR YR 1977 TOTAL 40730 MEAN 112 MAX 1910 MIN 12 CFSM .60 IN 8.10

STREAMS TRIBUTARY TO DETROIT RIVER

04167000 MIDDLE RIVER ROUGE NEAR GARDEN CITY, MI

LOCATION.--Lat 42°20'55", long 83°18'45", in SW¼ NW¼ sec.6, T.2 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 200 ft (61 m) downstream from bridge on Inkster Road, 1.8 mi (2.9 km) northeast of Garden City, and 6.0 mi (9.7 km) upstream from mouth.

DRAINAGE AREA.--99.9 mi² (258.7 km²).

PERIOD OF RECORD.--October 1930 to September 1933 (published as "at Detroit"), June 1947 to September 1977 (discontinued as a continuous-record station; converted to a crest-stage partial-record station). Monthly discharge only for October, November 1930, published in WSP 1307.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 600.95 ft (183.170 m) above mean sea level. Nov. 21, 1930 to Sept. 30, 1933, nonrecording gage at site 4.8 mi (7.7 km) downstream at datum 17.48 ft (5.328 m) lower. June 6, 1947 to Oct. 18, 1948, nonrecording gage at site 200 ft (61 m) upstream at present datum.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by reservoirs above station since 1956. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--33 years, 69.0 ft³/s (1.954 m³/s), 9.38 in/yr (238 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,330 ft³/s (66.0 m³/s) June 26, 1968; maximum gage height, 10.50 ft (3.200 m) May 10, 1948; minimum discharge, 0.9 ft³/s (0.025 m³/s) Aug. 16, 1956.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,060 ft³/s (30.0 m³/s) Apr. 25, gage height, 8.90 ft (2.713 m), only peak above base of 700 ft³/s (19.8 m³/s); minimum, 14 ft³/s (0.40 m³/s) Sept. 12, gage height, 1.65 ft (0.503 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	26	37	30	24	23	60	115	106	65	97	21	19
2	24	32	28	24	23	51	273	128	42	46	20	28
3	24	29	27	24	23	53	444	89	36	30	20	24
4	24	27	27	24	24	305	312	130	33	27	20	19
5	27	27	27	24	24	404	338	110	91	50	66	18
6	241	25	27	24	24	201	253	92	272	31	46	18
7	168	25	27	24	24	108	167	73	99	29	28	17
8	56	25	27	24	25	84	123	65	59	42	28	17
9	38	25	27	23	26	91	100	58	58	95	27	18
10	31	26	27	23	28	101	88	55	42	26	67	18
11	28	26	26	23	31	92	79	52	37	27	49	16
12	28	25	26	23	35	116	71	50	42	38	49	16
13	28	25	25	23	42	166	67	49	40	30	28	137
14	28	25	25	23	35	127	61	46	36	26	23	78
15	27	24	25	23	30	95	58	42	33	24	20	43
16	27	24	25	23	27	77	56	40	32	27	19	72
17	25	24	25	23	25	65	54	49	42	25	21	56
18	25	25	26	23	24	77	51	183	61	29	19	80
19	27	25	26	23	23	96	51	78	41	141	18	195
20	39	24	30	23	24	103	60	56	31	63	18	130
21	36	25	31	23	25	93	53	46	28	33	25	47
22	33	24	30	23	30	120	144	118	26	25	37	33
23	28	24	29	23	66	106	417	341	25	23	28	31
24	46	24	27	23	294	80	441	154	25	34	65	54
25	35	24	27	23	230	60	811	84	27	117	29	41
26	30	51	28	23	185	68	864	60	25	41	22	293
27	27	99	28	23	122	66	406	49	24	27	20	80
28	25	56	28	23	83	451	221	43	24	24	19	45
29	25	42	27	23	---	528	148	38	75	22	22	35
30	32	33	26	23	---	315	113	35	92	22	22	31
31	52	---	24	23	---	170	---	39	---	21	19	---
TOTAL	1310	927	838	721	1495	4529	6439	2558	1563	1292	915	1709
MEAN	42.3	30.9	27.0	23.3	53.4	146	215	82.5	52.1	41.7	29.5	57.0
MAX	241	99	31	24	294	528	864	341	272	141	67	293
MIN	24	24	24	23	23	51	51	35	24	21	18	16
CFSM	.42	.31	.27	.23	.54	1.46	2.15	.83	.52	.42	.30	.57
IN.	.49	.35	.31	.27	.56	1.69	2.40	.95	.58	.48	.34	.64

CAL YR 1976 TOTAL 43110 MEAN 118 MAX 1390 MIN 18 CFSM 1.18 IN 16.05
WTR YR 1977 TOTAL 24296 MEAN 66.6 MAX 864 MIN 16 CFSM .67 IN 9.05

04168000 LOWER RIVER ROUGE AT INKSTER, MI

LOCATION.--Lat 42°18'00", long 83°18'00", in SW¼ SE¼ sec.19, T.2 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 10 ft (3 m) downstream from bridge on John Daly Road, 0.6 mi (1.0 km) northeast of Inkster, and 4.8 mi (7.7 km) upstream from mouth.

DRAINAGE AREA.--83.2 mi² (215.5 km²).

PERIOD OF RECORD.--June 1947 to current year.

REVISED RECORDS.--WSP 1174: 1948(M). WSP 1437: 1949. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 593.14 ft (180.789 m) above mean sea level. Prior to Oct. 20, 1948, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 50.9 ft³/s (1.441 m³/s), 8.31 in/yr (211 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,600 ft³/s (102 m³/s) June 26, 1968, gage height, 13.62 ft (4.151 m); minimm, 0.2 ft³/s (0.006 m³/s) Sept. 13, 1955, Jan. 23, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,220 ft³/s (34.6 m³/s) Apr. 26, gage height, 9.95 ft (3.033 m), only peak above base of 900 ft³/s (25.5 m³/s); minimum, 1.7 ft³/s (0.048 m³/s) Aug. 18, gage height, 2.64 ft (0.805 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.6	8.7	7.0	6.0	6.0	46	74	49	26	31	2.0	2.4
2	3.3	11	6.0	6.0	6.0	35	205	43	6.6	11	2.0	17
3	2.6	8.7	5.8	6.0	6.0	34	576	38	8.7	4.7	6.9	3.9
4	2.4	5.2	5.4	6.0	6.0	338	193	66	4.4	3.3	7.6	2.2
5	2.8	4.7	5.2	6.0	6.2	451	306	64	32	9.0	5.9	2.4
6	114	4.7	5.2	6.0	6.4	106	157	51	181	3.1	8.7	2.2
7	77	4.7	5.0	6.0	6.6	65	92	33	62	4.4	4.7	2.2
8	20	5.5	5.0	6.0	7.0	60	69	26	22	32	4.7	2.0
9	9.5	4.7	5.0	6.0	7.4	90	54	21	28	75	3.3	4.2
10	5.9	5.0	5.0	6.0	7.8	89	47	19	14	5.5	28	5.0
11	3.9	5.0	5.2	6.0	8.6	68	42	17	9.9	4.7	19	2.8
12	2.8	5.2	5.4	6.0	10	83	35	15	12	6.6	19	2.8
13	2.8	5.5	5.8	6.0	12	134	31	14	9.9	7.3	5.9	73
14	2.4	5.5	6.2	6.0	10	85	28	13	7.6	3.1	4.2	31
15	2.6	5.5	6.9	6.0	8.5	64	25	12	5.9	2.2	3.1	22
16	2.4	5.5	6.9	6.0	7.5	51	23	9.9	5.0	5.5	4.2	47
17	2.6	5.5	5.9	6.0	6.8	39	22	10	21	2.2	2.6	25
18	2.4	5.5	6.2	6.0	6.4	52	21	38	30	5.9	2.0	30
19	5.5	6.2	6.6	6.0	6.3	73	20	15	14	169	2.0	88
20	9.9	6.6	12	6.0	6.4	85	28	10	6.9	60	2.8	56
21	6.6	6.6	9.9	6.0	7.0	76	25	8.3	4.7	14	12	17
22	6.9	5.9	7.5	6.0	10	123	84	54	3.3	6.2	12	6.3
23	5.5	6.2	7.0	6.0	47	107	395	42	2.8	3.6	6.2	7.3
24	24	6.2	6.8	6.0	234	73	612	15	2.6	6.2	23	34
25	8.7	6.2	6.8	6.0	142	67	633	9.5	2.6	65	5.9	22
26	6.2	31	6.7	6.0	50	66	1080	6.6	2.6	14	3.6	248
27	5.2	60	6.6	6.0	74	69	295	7.3	2.4	5.2	2.8	67
28	4.4	25	6.6	6.0	60	384	130	5.2	2.2	3.1	2.8	22
29	4.4	12	6.5	6.0	---	790	82	4.7	28	2.6	5.2	13
30	10	8.0	6.4	6.0	---	288	62	3.9	32	4.4	2.8	9.9
31	22	---	6.2	6.0	---	118	---	14	---	2.2	2.4	---
TOTAL	382.3	286.0	198.7	186.0	771.9	4209	5446	734.4	590.1	572.0	217.3	869.6
MEAN	12.3	9.53	6.41	6.00	27.6	136	182	23.7	19.7	18.5	7.01	29.0
MAX	114	60	12	6.0	234	790	1080	66	181	169	28	248
MIN	2.4	4.7	5.0	6.0	6.0	34	20	3.9	2.2	2.2	2.0	2.0
CFSM	.15	.12	.08	.07	.33	1.64	2.19	.29	.24	.22	.08	.35
IN.	.17	.13	.09	.08	.35	1.88	2.43	.33	.26	.26	.10	.39

CAL YR 1976 TOTAL 25199.5 MEAN 68.9 MAX 1610 MIN 1.5 CFSM .83 IN 11.27
WTR YR 1977 TOTAL 14463.3 MEAN 39.6 MAX 1080 MIN 2.0 CFSM .48 IN 6.47

STREAMS TRIBUTARY TO LAKE ERIE

04170000 HURON RIVER AT MILFORD, MI

LOCATION.--Lat 42°34'44", long 83°37'36", in NE¼ sec.16, T.2 N., R.7 E., Oakland County, Hydrologic Unit 04090005, on left bank 40 ft (12 m) downstream from bridge on General Motors Road, 0.5 mi (0.8 km) downstream from Sherwood Creek, and 0.5 mi (0.8 km) west of Milford.

DRAINAGE AREA.--132 mi² (342 km²).

PERIOD OF RECORD.--September 1948 to current year.

REVISED RECORDS.--WSP 1337: 1952(m). WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 880.00 ft (268.224 m) above mean sea level. Prior to Apr. 1, 1970, at site 240 ft (73 m) upstream at same datum.

REMARKS.--Records good. Flow below about 300 ft³/s (8.50 m³/s) regulated by powerplant 1.5 mi (2.4 km) above station prior to May 20, 1957; occasional regulation for lake level control since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 97.9 ft³/s (2.773 m³/s), 10.07 in/yr (256 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 645 ft³/s (18.3 m³/s) Apr. 5, 1950; maximum gage height, 8.26 ft (2.518 m) June 28, 1968; minimum daily discharge, 5.2 ft³/s (0.15 m³/s) Oct. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 252 ft³/s (7.14 m³/s) Apr. 3, gage height, 6.34 ft (1.932 m); minimum, 20 ft³/s (0.57 m³/s) Aug. 21; minimum gage height, 4.23 ft (1.289 m) July 28, 29.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	51	89	72	55	59	88	190	159	35	56	26	34
2	50	82	66	55	55	84	199	155	41	50	26	39
3	47	76	62	56	55	83	238	148	42	43	27	36
4	46	73	64	56	57	122	242	143	41	40	30	33
5	46	69	64	56	58	153	230	141	42	43	34	32
6	74	66	65	57	57	131	223	135	54	45	40	32
7	93	64	69	58	56	121	208	124	61	43	46	32
8	80	65	68	58	55	123	194	109	57	41	43	33
9	73	64	67	59	55	134	181	99	54	37	41	33
10	71	63	67	59	56	149	168	85	49	33	40	30
11	75	63	65	58	58	149	156	79	47	32	37	29
12	73	61	64	59	61	158	142	73	50	37	37	29
13	70	62	61	57	65	180	133	67	53	38	33	43
14	69	68	61	56	65	176	130	55	52	35	32	48
15	67	68	59	57	63	165	119	47	46	33	33	47
16	65	65	60	58	61	153	111	45	45	47	36	57
17	64	64	60	58	59	152	105	47	53	50	32	50
18	64	64	60	59	60	151	99	73	91	47	29	52
19	67	68	60	59	59	146	96	75	92	47	24	61
20	72	71	63	59	60	147	95	64	81	45	22	59
21	73	69	62	59	59	146	90	58	72	42	22	53
22	73	67	64	61	59	145	97	57	63	36	24	48
23	71	65	63	61	59	145	149	72	55	30	26	50
24	73	63	63	61	112	137	178	66	52	30	31	53
25	74	62	62	61	113	135	197	58	49	31	36	53
26	73	72	62	61	98	131	215	51	46	26	35	60
27	68	109	62	61	98	129	209	45	47	23	33	59
28	61	106	63	60	94	180	181	40	44	22	33	56
29	63	92	61	60	---	230	166	35	43	23	36	52
30	80	82	59	60	---	218	165	31	48	27	35	50
31	93	---	56	59	---	201	---	31	---	27	30	---
TOTAL	2119	2152	1954	1813	1866	4562	4906	2467	1605	1159	1009	1343
MEAN	68.4	71.7	63.0	58.5	66.6	147	164	79.6	53.5	37.4	32.5	44.8
MAX	93	109	72	61	113	230	242	159	92	56	46	61
MIN	46	61	56	55	55	83	90	31	35	22	22	29
CFSM	.52	.54	.48	.44	.51	1.11	1.24	.60	.41	.28	.25	.34
IN.	.60	.61	.55	.51	.53	1.29	1.38	.70	.45	.33	.28	.38

CAL YR 1976 TOTAL 47544 MEAN 130 MAX 502 MIN 27 CFSM .99 IN 13.40
WTR YR 1977 TOTAL 26955 MEAN 73.8 MAX 242 MIN 22 CFSM .56 IN 7.60

04170500 HURON RIVER NEAR NEW HUDSON, MI

LOCATION.--Lat 42°30'45", long 83°40'35", in NE¼ sec.1, T.1 N., R.6 E., Livingston County, Hydrologic Unit 04090005, on right bank 150 ft (46 m) downstream from Kent Lake Dam, 2 mi (3 km) upstream from Woodruff Creek, and 3 mi (5 km) west of New Hudson.

DRAINAGE AREA.--148 mi² (383 km²).

PERIOD OF RECORD.--August 1948 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 868.00 ft (264.566 m) above mean sea level.

REMARKS.--Records good. Occasional regulation by Kent Lake. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 111 ft³/s (3.144 m³/s), 10.18 in/yr (259 mm/yr). The figure published in the 1976 report was in error; the correct figure is 28 years, 112 ft³/s (3.172 m³/s), 10.28 in/yr (261 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,080 ft³/s (30.6 m³/s) Dec. 29, 1950, gage height, 5.05 ft (1.539 m), from rating curve extended above 600 ft³/s (17.0 m³/s); minimum, 2.6 ft³/s (0.074 m³/s) May 27, 1963, gage height, 0.53 ft (0.162 m); minimum daily, 6.4 ft³/s (0.18 m³/s) May 7, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 280 ft³/s (7.93 m³/s) Nov. 17, gage height, 2.89 ft (0.881 m); minimum, 15 ft³/s (0.42 m³/s) May 19, 20, gage height, 0.68 ft (0.207 m); minimum daily, 20 ft³/s (0.57 m³/s) May 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	85	131	141	79	70	124	200	94	44	63	34	41
2	86	186	135	70	70	121	203	121	47	65	30	51
3	86	195	129	72	72	118	222	128	47	62	30	52
4	84	201	122	73	72	132	161	134	48	61	34	46
5	84	189	93	76	72	160	139	131	55	61	39	46
6	110	154	79	74	73	163	181	129	66	59	51	44
7	121	141	73	74	73	157	192	125	62	61	62	42
8	118	183	70	74	73	154	132	115	62	58	72	42
9	117	183	69	74	73	155	100	107	63	55	77	38
10	111	152	68	74	73	166	128	98	58	46	82	39
11	111	138	66	74	73	172	94	94	56	41	84	38
12	107	175	68	74	77	180	100	90	62	43	84	37
13	111	183	66	74	80	194	110	86	61	46	77	58
14	110	152	66	74	82	192	117	82	62	43	74	66
15	108	178	65	74	82	183	124	72	59	42	66	66
16	110	183	66	74	83	172	124	66	56	61	61	77
17	110	214	66	74	84	170	122	65	59	68	61	80
18	110	209	68	74	83	181	120	88	94	70	52	83
19	112	166	69	74	83	164	115	50	95	76	46	86
20	118	146	73	74	83	163	114	20	91	70	39	84
21	118	180	73	74	83	161	111	33	86	72	37	82
22	118	181	74	74	86	98	121	48	80	62	41	79
23	120	151	77	74	87	83	146	63	72	47	39	79
24	124	138	77	74	108	110	157	65	65	44	44	79
25	122	129	77	74	128	124	186	63	68	51	42	79
26	121	131	79	74	128	131	200	55	63	39	43	86
27	117	149	80	74	129	135	197	52	61	33	42	87
28	111	154	84	76	127	166	194	55	59	27	43	84
29	110	152	87	74	---	195	170	54	58	28	55	83
30	118	145	84	73	---	213	122	46	62	35	54	83
31	131	---	84	72	---	211	---	44	---	34	44	---
TOTAL	3419	4969	2528	2293	2487	4848	4402	2473	1921	1623	1639	1937
MEAN	110	166	81.5	74.0	86.0	156	147	79.8	64.0	52.4	52.9	64.6
MAX	131	214	141	79	129	213	222	134	95	76	84	87
MIN	84	129	65	70	70	83	94	20	44	27	30	37
CFSM	.74	1.12	.55	.50	.58	1.05	.99	.54	.43	.35	.36	.44
IN.	.86	1.25	.64	.58	.60	1.22	1.11	.62	.48	.41	.41	.49

CAL YR 1976 TOTAL 52870 MEAN 144 MAX 403 MIN 32 CFSM .97 IN 13.29
WTR YR 1977 TOTAL 34459 MEAN 94.4 MAX 222 MIN 20 CFSM .64 IN 8.66

STREAMS TRIBUTARY TO LAKE ERIE

04172000 HURON RIVER NEAR HAMBURG, MI

LOCATION.--Lat 42°27'55", long 83°48'00", in sec.24, T.1 N., R.5 E., Livingston County, Hydrologic Unit 04090005, on right bank at downstream side of bridge on Hamburg Road, 1.1 mi (1.8 km) north of Hamburg, and 3 mi (5 km) upstream from Strawberry Lake.

DRAINAGE AREA.--308 mi² (798 km²).

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 850.00 ft (259.080 m) above mean sea level (levels by Michigan Department of Natural Resources). Prior to Aug. 12, 1953, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by Kent Lake, 11 mi (18 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--26 years, 209 ft³/s (5.919 m³/s), 9.21 in/yr (234 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,560 ft³/s (44.2 m³/s) May 15, 1956; maximum gage height, 8.46 ft (2.579 m) June 30, 1968; minimum discharge, 32 ft³/s (0.91 m³/s) July 2, 3, 1965; minimum gage height, 3.16 ft (0.963 m) Aug. 1-3, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 478 ft³/s (13.5 m³/s) Apr. 4, gage height, 5.35 ft (1.631 m); minimum, 53 ft³/s (1.50 m³/s) Aug. 4, Sept. 12; minimum gage height, 3.51 ft (1.070 m) Sept. 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	131	160	200	110	110	220	423	381	112	124	61	74
2	129	164	190	110	110	207	434	326	111	120	58	75
3	126	188	180	110	110	202	455	306	109	117	56	76
4	123	227	170	110	110	221	463	303	109	112	54	73
5	119	238	160	110	110	275	471	303	111	108	56	71
6	135	244	150	110	110	310	445	297	126	103	59	67
7	170	217	145	110	110	317	435	284	136	98	63	66
8	189	189	140	110	110	310	431	269	136	95	69	62
9	184	197	135	110	110	312	397	247	141	91	75	60
10	169	220	130	110	110	320	337	228	139	84	81	57
11	157	202	130	110	110	325	321	211	134	77	88	55
12	147	180	130	110	110	336	272	197	134	73	92	54
13	142	191	125	110	115	358	247	183	136	72	91	64
14	135	216	125	110	120	373	245	173	137	72	88	76
15	130	202	120	110	130	376	250	165	136	70	83	84
16	125	206	120	110	130	370	252	157	129	79	80	96
17	122	223	120	110	130	350	250	153	122	95	77	107
18	120	234	120	110	130	341	242	179	152	103	72	109
19	120	259	120	110	130	331	235	189	186	121	68	116
20	128	241	120	110	130	322	225	157	192	128	65	117
21	136	207	120	110	130	309	219	130	183	120	63	115
22	138	210	140	110	130	304	222	127	170	110	64	111
23	139	226	140	110	160	252	272	137	154	98	64	110
24	143	205	130	110	205	228	312	151	141	87	65	109
25	147	181	120	110	230	230	345	158	132	85	64	111
26	145	174	120	110	242	236	383	154	125	80	64	116
27	143	198	115	110	241	244	412	147	117	73	64	124
28	137	220	110	110	232	284	440	141	111	65	63	126
29	132	210	110	110	---	346	442	134	113	60	66	126
30	130	200	110	110	---	386	426	125	113	60	73	127
31	147	---	110	110	---	413	---	117	---	62	75	---
TOTAL	4338	6229	4155	3410	3905	9408	10303	6229	4047	2842	2161	2734
MEAN	140	208	134	110	139	303	343	201	135	91.7	69.7	91.1
MAX	189	259	200	110	242	413	471	381	192	128	92	127
MIN	119	160	110	110	110	202	219	117	109	60	54	54
CFSM	.46	.68	.44	.36	.45	.98	1.11	.65	.44	.30	.23	.30
IN.	.52	.75	.50	.41	.47	1.14	1.24	.75	.49	.34	.26	.33

CAL YR 1976 TOTAL 100531 MEAN 275 MAX 870 MIN 79 CFSM .89 IN 12.14
WTR YR 1977 TOTAL 59761 MEAN 164 MAX 471 MIN 54 CFSM .53 IN 7.22

04173000 HURON RIVER NEAR DEXTER, MI

LOCATION.--Lat 42°23'10", long 83°54'40", in S½ sec.13, T.1 S., R.4 E., Washtenaw County, Hydrologic Unit 04090005, on right bank 20 ft (6 m) downstream from bridge on North Territorial Road, 0.5 mi (0.8 km) east of Hudson Mills, 2.0 mi (3.2 km) downstream from Portage Lake Outlet and 4.0 mi (6.4 km) north of Dexter.

DRAINAGE AREA.--522 mi² (1,352 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August to December 1904 (gage heights only), March 1946 to September 1972, water years 1973-75 (annual maximum only), October 1975 to September 1977 (discontinued as a continuous-record station; converted to a crest-stage partial-record station). Published as "at Dover" 1904.

REVISED RECORD.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 837.11 ft (255.151 m) above mean sea level (levels by Michigan Department of Natural Resources). August to December 1904, nonrecording gage at site 1.0 mi (1.6 km) upstream at different datum. Mar. 5, 1946, to July 30, 1953, nonrecording gage at present site and datum. October 1, 1972, to September 30, 1975, crest-stage gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by lake level control operations above station.

AVERAGE DISCHARGE.--28 years, (water years 1947-72, 1976-77) 349 ft³/s (9.884 m³/s), 9.08 in/yr (231 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,120 ft³/s (88.4 m³/s) Apr. 9, 1947, gage height, 8.17 ft (2.490 m), from graph based on gage readings; minimum, 33 ft³/s (0.93 m³/s) Apr. 12, 1972, gage height, 2.05 ft (0.625 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,220 ft³/s (34.6 m³/s) Apr. 28, gage height, 4.99 ft (1.521 m); minimum, 64 ft³/s (1.81 m³/s) Oct. 5; minimum gage height, 2.38 ft (0.725 m) Sept. 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	151	259	258	150	180	321	717	805	145	190	91	98
2	152	307	246	150	175	277	772	587	136	135	86	102
3	152	344	252	150	170	256	855	547	129	141	84	101
4	152	169	235	150	166	301	795	700	123	143	83	96
5	152	126	236	150	162	522	814	599	140	145	81	97
6	338	195	226	150	162	497	844	544	218	141	84	95
7	228	309	222	150	160	496	837	646	131	138	83	93
8	112	302	217	150	157	516	745	523	129	139	85	89
9	152	239	210	150	155	544	664	305	152	146	85	85
10	171	231	201	150	151	539	672	244	152	133	95	81
11	182	245	205	150	145	535	619	336	157	122	99	75
12	187	344	194	150	150	580	535	502	224	118	104	73
13	192	349	189	150	152	610	391	291	177	112	102	94
14	212	299	184	150	157	615	322	225	135	107	103	103
15	173	280	181	150	174	619	474	260	146	105	102	99
16	173	228	181	150	213	618	488	257	149	149	102	125
17	210	205	178	150	185	585	466	238	157	134	100	137
18	190	269	174	150	164	625	318	405	270	133	92	155
19	141	324	173	150	163	652	298	253	183	378	89	281
20	155	308	176	150	163	619	461	196	236	144	88	167
21	161	310	178	150	163	506	389	228	284	174	88	140
22	235	301	176	150	161	398	308	307	232	177	90	153
23	290	256	173	150	163	456	651	158	147	223	88	164
24	149	242	173	150	197	454	622	248	163	166	94	198
25	146	244	171	145	267	432	708	176	167	135	87	167
26	291	248	171	145	352	396	688	175	162	127	85	306
27	243	263	170	150	390	415	762	177	154	121	83	154
28	155	269	165	150	388	395	895	173	150	118	82	149
29	158	272	165	150	---	704	859	162	157	118	91	160
30	169	267	160	160	---	666	720	154	192	114	93	169
31	224	---	155	165	---	548	---	152	---	101	95	---
TOTAL	5796	8004	5989	4665	5385	15697	18689	10573	5097	4527	2814	4006
MEAN	187	267	193	150	192	506	623	341	170	146	90.8	134
MAX	338	349	258	165	390	704	895	805	284	378	104	306
MIN	112	126	155	145	145	256	298	152	123	101	81	73
CFSM	.36	.51	.37	.29	.37	.97	1.19	.65	.33	.28	.17	.26
IN.	.41	.57	.43	.33	.38	1.12	1.33	.75	.36	.32	.20	.29

CAL YR 1976 TOTAL 175301 MEAN 479 MAX 2500 MIN 98 CFSM .92 IN 12.49
WTR YR 1977 TOTAL 91242 MEAN 250 MAX 895 MIN 73 CFSM .48 IN 6.50

04173000 HURON RIVER NEAR DEXTER, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1971 to current year.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Washtenaw County Health Department.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	BIOCHEMICAL OXYGEN DEMAND 5 DAY (MG/L)	COMPLETE COLIFORM (MPN)	FECAL COLIFORM (EC BROTH) (MPN)
NOV												
29...	1305	272	950	8.3	-8.0	1.0	--	13.8	99	2.2	430	<30
JAN												
20...	1150	150	970	8.0	-8.0	1.0	--	11.4	82	.7	150	<30
MAR												
16...	1600	618	554	7.9	11.5	4.5	6	11.0	87	3.0	930	<30
MAY												
19...	1330	140	489	8.6	28.0	23.0	--	13.1	156	1.2	430	<30
JUL												
21...	1315	178	472	8.4	26.5	28.0	--	8.9	114	1.8	2100	40
SEP												
21...	1400	140	539	8.5	16.0	18.5	5	8.9	97	3.4	1100	30

DATE	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	CARBON DIOXIDE (CO2) (MG/L)
NOV											
29...	--	--	--	--	--	--	240	0	197	--	1.9
JAN											
20...	--	--	--	--	--	--	280	0	230	--	4.5
MAR											
16...	230	25	62	18	16	1.8	250	0	205	38	5.0
MAY											
19...	--	--	--	--	--	--	240	10	213	--	1.0
JUL											
21...	--	--	--	--	--	--	220	2	184	--	1.4
SEP											
21...	230	53	58	21	22	2.3	210	3	177	41	1.1

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITRO-GEN (N) (MG/L)	TOTAL ORGANIC NITRO-GEN (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)
NOV												
27...	--	--	--	--	--	.01	.01	--	.01	--	--	--
JAN												
20...	--	--	--	--	--	.20	.02	--	.35	--	--	--
MAR												
16...	33	.2	7.4	308	301	.36	.01	.32	.32	.78	1.1	1.5
MAY												
19...	--	--	--	--	--	.10	.01	--	.22	--	--	--
JUL												
21...	--	--	--	--	--	.06	.01	--	.82	--	--	--
SEP												
21...	43	.1	5.9	321	300	.00	.00	.00	.02	.40	.42	.42

DATE	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	TOTAL ORTHO PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
NOV												
27...	--	.00	.00	--	--	--	--	--	--	--	--	.00
JAN												
20...	--	.03	.00	--	--	--	--	--	--	--	--	.00
MAR												
16...	6.5	.03	.01	.01	--	--	--	90	--	60	--	.00
MAY												
19...	--	.00	.00	--	--	--	--	--	--	--	--	.00
JUL												
21...	--	.00	.00	--	--	--	--	--	--	--	--	.00
SEP												
21...	1.9	.01	.00	.00	1	0	0	20	3	10	.0	.00

04173254 MILL CREEK NEAR LIMA CENTER, MI

LOCATION.--Lat 42°16'54", long 83°55'22", in NE¼ sec.26, T.2 S., R.4 E., Washtenaw County, Hydrologic Unit 04090005, at bridge on Jerusalem Road, 0.3 mi (0.5 km) upstream from North Fork Mill Creek, 2.0 mi (3.2 km) southeast of Lima Center, 2.1 mi (3.4 km) upstream from gaging station near Dexter, and 6.2 mi (10 km) upstream from Huron River.

DRAINAGE AREA.--59.8 mi² (155 km²).

PERIOD OF RECORD.--Water years 1971 to current year.

REMARKS.--Estimates of water discharge are based on current records of streamflow at the gaging station near Dexter and records of streamflow at the partial-record station, Mill Creek near Lima Center.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Washtenaw County Health Department.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	BIOCHEMICAL OXYGEN DEMAND 5 DAY (MG/L)	COMPLETE COLIFORM (MPN)	FECAL COLIFORM (EC BROTH) (MPN)
NOV												
29...	1535	E15	640	8.0	-8.0	.0	--	13.6	96	2.0	4600	90
JAN												
20...	1355	E9.0	600	7.8	-6.5	.0	--	9.6	68	1.7	2400	<90
MAR												
17...	0830	--	746	8.1	-1.0	3.0	33	11.2	85	2.8	4600	230
MAY												
19...	1515	E20	690	8.2	30.0	25.0	--	9.4	115	1.6	2400	2400
JUL												
21...	1515	E13	600	8.3	22.5	25.5	--	9.2	114	2.4	4600	230
SEP												
22...	0900	E4.0	676	8.2	12.0	14.0	8	8.1	80	1.6	1500	300

DATE	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	CARBON DIOXIDE (CO2) (MG/L)
NOV											
29...	--	--	--	--	--	--	340	0	279	--	5.4
JAN											
20...	--	--	--	--	--	--	360	0	295	--	9.1
MAR											
17...	390	170	120	23	9.0	2.6	280	0	230	130	3.6
MAY											
19...	--	--	--	--	--	--	350	0	287	--	3.5
JUL											
21...	--	--	--	--	--	--	310	0	254	--	2.5
SEP											
22...	340	61	95	24	14	2.4	340	0	279	57	3.4

E--ESTIMATED VALUE

04173254 MILL CREEK NEAR LIMA CENTER, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITRO-GEN (N) (MG/L)
NOV 29...	--	--	--	--	--	.04	.01	--	.01
JAN 20...	--	--	--	--	--	.27	.02	--	.25
MAR 17...	23	.2	8.6	519	469	3.2	.04	3.2	.12
MAY 19...	--	--	--	--	--	.40	.01	--	.24
JUL 21...	--	--	--	--	--	.12	.01	--	.67
SEP 22...	27	.2	13	409	404	.13	.00	.11	.06

DATE	TOTAL ORGANIC NITRO-GEN (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	TOTAL ORTHO PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)
NOV 29...	--	--	--	--	.00	.00	--	--	--
JAN 20...	--	--	--	--	.01	.00	--	--	--
MAR 17...	1.3	1.4	4.6	20	.04	.02	.01	--	--
MAY 19...	--	--	--	--	.01	.01	--	--	--
JUL 21...	--	--	--	--	.00	.00	--	--	--
SEP 22...	.17	.23	.36	1.6	.03	.00	.00	1	0

DATE	DIS-SOLVED COBALT (CO) (UG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	DIS-SOLVED NICKEL (NI) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
NOV 29...	--	--	--	--	--	--	--	--	.00
JAN 20...	--	--	--	--	--	--	--	--	.00
MAR 17...	--	120	--	90	--	--	--	--	.00
MAY 19...	--	--	--	--	--	--	--	--	.00
JUL 21...	--	--	--	--	--	--	--	--	.00
SEP 22...	0	10	5	40	.0	2	0	10	.00

04173310 NORTH FORK MILL CREEK NEAR CHELSEA, MI

LOCATION.--Lat 42°19'34", long 84°00'57", in SE¼ sec.1, T.2 S., R.3 E., Washtenaw County, Hydrologic Unit 04090005, at bridge on McKinley Road, 0.4 mi (0.6 km) upstream from Letts Creek, 0.5 mi (0.8 km) north of Chelsea, and 6.6 mi (10.6 km) upstream from Mill Creek.

DRAINAGE AREA.--14.6 mi² (37.8 km²).

PERIOD OF RECORD.--Water years 1971 to current year.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Washtenaw County Health Department.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	STAGE (FT ABOVE DATUM)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	BIOCHEMICAL OXYGEN DEMAND 5 DAY (MG/L)	COMPLETE COLIFORM (MPN)	FECAL COLIFORM (EC BROTH) (MPN)
NOV												
29...	1405	41.43	540	7.7	-8.0	.0	--	12.0	84	.6	4600	70
JAN												
20...	1255	41.35	560	7.7	-4.5	.0	--	11.5	81	.3	1500	<30
MAR												
16...	1700	42.04	396	7.9	7.5	7.5	20	11.0	94	.3	2100	40
MAY												
19...	1430	41.30	520	8.2	29.5	23.0	--	8.4	100	.6	4600	430
JUL												
21...	1430	41.94	520	8.2	25.5	24.0	--	7.8	94	.3	11000	930
SEP												
21...	1600	41.33	504	8.2	15.5	14.5	33	8.8	88	.9	3000	230

DATE	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	CARBON DIOXIDE (CO2) (MG/L)
NOV											
29...	--	--	--	--	--	--	260	0	213	--	8.3
JAN											
20...	--	--	--	--	--	--	290	0	238	--	9.3
MAR											
16...	190	34	55	13	6.4	1.3	190	0	156	31	3.8
MAY											
19...	--	--	--	--	--	--	280	0	230	--	2.8
JUL											
21...	--	--	--	--	--	--	280	0	230	--	2.8
SEP											
21...	260	39	74	18	10	2.0	270	0	221	33	2.7

04173310 NORTH FORK MILL CREEK NEAR CHELSEA, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITRO-GEN (N) (MG/L)	TOTAL ORGANIC NITRO-GEN (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)
NOV												
29...	--	--	--	--	--	.01	.00	--	.01	--	--	--
JAN												
20...	--	--	--	--	--	.17	.02	--	.35	--	--	--
MAR												
16...	18	.2	7.1	246	227	.20	.01	.20	.05	.75	.80	1.0
MAY												
19...	--	--	--	--	--	.16	.01	--	.13	--	--	--
JUL												
21...	--	--	--	--	--	.20	.01	--	.53	--	--	--
SEP												
21...	27	.1	13	328	311	.17	.01	.17	.05	.54	.59	.77

DATE	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	TOTAL ORTHO PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
NOV												
29...	--	.01	.01	--	--	--	--	--	--	--	--	.00
JAN												
20...	--	.01	.00	--	--	--	--	--	--	--	--	.00
MAR												
16...	4.5	.04	.02	.02	--	--	--	170	--	30	--	.00
MAY												
19...	--	.00	.00	--	--	--	--	--	--	--	--	.00
JUL												
21...	--	.01	.00	--	--	--	--	--	--	--	--	.00
SEP												
21...	3.4	.13	.01	.00	0	0	0	60	4	40	.0	.00

04173350 NORTH FORK MILL CREEK NEAR LIMA CENTER, MI

LOCATION.--Lat 42°17'46", long 83°57'33", in SW¼ sec.23, T.2 S., R.4 E., Washtenaw County, Hydrologic Unit 04090005, at bridge on Dancer Road, 1.2 mi (1.9 km) southeast of Lima Center, 5.1 mi (8.2 km) downstream from Letts Creek, and 1.1 mi (1.8 km) upstream from Mill Creek.

DRAINAGE AREA.--59.0 mi² (153 km²).

PERIOD OF RECORD.--Water years 1971 to current year.

REMARKS.--Estimates of water discharge based on previous streamflow partial-record data and correlation with station 04173500.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Washtenaw County Health Department.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	BIOCHEMICAL OXYGEN DEMAND 5 DAY (MG/L)	COMPLETE COLIFORM (MPN)	FECAL COLIFORM (EC BROTH) (MPN)
NOV												
29...	1450	E14	670	7.8	-8.0	.0	--	12.0	85	2.5	11000	230
JAN												
20...	1445	E12	750	7.6	-7.0	.0	--	9.2	65	1.0	430	<30
MAR												
17...	0930	E58	614	8.1	2.5	3.5	22	10.4	80	1.6	11000	40
MAY												
19...	1600	E24	650	8.1	30.0	24.0	--	9.0	110	2.7	11000	930
JUL												
21...	1545	E7.0	700	8.0	21.5	25.5	--	94.0	96	3.2	930	930
SEP												
22...	1000	E1.0	688	7.9	14.5	14.5	28	7.1	71	3.7	1500	380

DATE	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	CARBON DIOXIDE (CO2) (MG/L)
NOV											
29...	--	--	--	--	--	--	290	0	238	--	7.4
JAN											
20...	--	--	--	--	--	--	340	0	279	--	14
MAR											
17...	300	95	89	19	15	2.2	250	0	205	77	3.2
MAY											
19...	--	--	--	--	--	--	320	0	262	--	4.1
JUL											
21...	--	--	--	--	--	--	310	0	254	--	5.0
SEP											
22...	330	76	[illegible]	23	25	3.0	310	0	254	58	6.2

E--ESTIMATED VALUE

04173350 NORTH FORK MILL CREEK NEAR LIMA CENTER, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITRO-GEN (N) (MG/L)	TOTAL ORGANIC NITRO-GEN (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)
NOV												
29...	--	--	--	--	--	.01	.02	--	.03	--	--	--
JAN												
20...	--	--	--	--	--	.60	.04	--	1.3	--	--	--
MAR												
17...	36	.2	8.2	408	373	.68	.04	.69	.22	.98	1.2	1.9
MAY												
19...	--	--	--	--	--	.46	.06	--	.36	--	--	--
JUL												
21...	--	--	--	--	--	.60	.14	--	.96	--	--	--
SEP												
22...	51	.2	14	458	426	.92	.08	.97	.16	.94	1.1	2.1

DATE	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	TOTAL ORTHO PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
NOV												
29...	--	.07	.06	--	--	--	--	--	--	--	--	.00
JAN												
20...	--	.02	.01	--	--	--	--	--	--	--	--	.00
MAR												
17...	8.5	.05	.02	.01	--	--	--	160	--	80	--	.00
MAY												
19...	--	.02	.01	--	--	--	--	--	--	--	--	.00
JUL												
21...	--	.11	.10	--	--	--	--	--	--	--	--	.00
SEP												
22...	9.3	.12	.06	.03	1	0	0	50	4	70	.0	.00

STREAMS TRIBUTARY TO LAKE ERIE

04173500 MILL CREEK NEAR DEXTER, MI

LOCATION.--Lat 42°18'00", long 83°53'55", in SW¼ sec.18, T.2 S., R.5 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 12 ft (4 m) downstream from bridge on Parker Road, 2.5 mi (4.0 km) south of Dexter, and 4 mi (6 km) upstream from mouth.

DRAINAGE AREA.--128 mi² (332 km²).

PERIOD OF RECORD.--February 1952 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (259 m) from topographic map (nearest 10 ft). Prior to May 23, 1958, non-recording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--25 years, 78.1 ft³/s (2.212 m³/s), 8.29 in/yr (211 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft³/s (42.5 m³/s) June 26, 1968, gage height, 12.95 ft (3.947 m); minimum, 7.3 ft³/s (0.21 m³/s) Dec. 13, 1963; minimum gage height, 4.94 ft (1.506 m) Dec. 13, 1963, Feb. 22, 1964.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 500 ft³/s (14.2 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 4	2400	*668	18.9	*10.21	3.112
Mar. 29	0400	618	17.5	9.94	3.030

Minimum discharge, 17 ft³/s (0.48 m³/s) Sept. 12, gage height, 5.34 ft (1.628 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	22	37	35	28	25	101	179	101	26	43	20	21
2	21	35	33	28	25	95	210	100	26	35	19	21
3	21	33	32	28	25	67	288	93	26	31	19	21
4	21	32	32	27	25	425	220	98	25	31	22	19
5	21	31	31	27	25	515	263	108	35	35	20	20
6	37	31	31	27	25	291	212	90	57	28	22	20
7	50	30	31	27	25	177	175	74	47	25	22	19
8	38	30	30	27	25	156	147	66	39	27	21	19
9	31	30	30	27	25	207	122	59	78	31	22	19
10	29	31	29	27	25	225	109	55	60	23	28	19
11	27	30	29	27	25	196	97	51	47	26	30	18
12	26	29	29	26	25	195	86	48	45	29	28	18
13	28	28	28	26	26	234	77	44	41	26	25	26
14	25	28	28	26	26	189	72	41	37	23	22	28
15	25	28	27	26	26	153	67	38	33	21	21	23
16	24	28	27	26	27	126	63	36	31	24	21	35
17	24	29	27	26	28	102	60	36	37	22	20	34
18	24	29	27	26	30	97	58	71	95	25	19	31
19	25	30	27	25	31	93	57	57	70	36	19	37
20	29	29	29	25	33	107	56	45	51	25	19	46
21	30	30	35	25	36	98	54	38	40	23	20	39
22	29	29	33	25	44	115	63	35	35	22	23	34
23	26	29	30	25	59	115	208	34	32	20	22	33
24	29	29	29	25	272	102	269	32	31	21	24	34
25	32	30	28	25	251	105	290	31	31	22	22	37
26	31	37	28	25	170	121	430	29	31	21	21	78
27	29	66	28	25	127	142	291	28	31	20	20	72
28	28	50	28	25	92	398	194	27	32	20	19	53
29	29	42	28	25	---	575	151	25	38	21	21	45
30	28	38	28	25	---	400	121	25	45	21	21	41
31	39	---	28	25	---	255	---	25	---	21	20	---
TOTAL	878	988	915	807	1578	6177	4689	1640	1252	798	672	960
MEAN	28.3	32.9	29.5	26.0	56.4	199	156	52.9	41.7	25.7	21.7	32.0
MAX	50	66	35	28	272	575	430	108	95	43	30	78
MIN	21	28	27	25	25	67	54	25	25	20	19	18
CFSM	.22	.26	.23	.20	.44	1.56	1.22	.41	.33	.20	.17	.25
IN.	.26	.29	.27	.23	.46	1.80	1.36	.48	.36	.23	.20	.28

CAL YR 1976 TOTAL 40156 MEAN 110 MAX 1000 MIN 20 CFSM .86 IN 11.67
WTR YR 1977 TOTAL 21354 MEAN 58.5 MAX 575 MIN 18 CFSM .46 IN 6.21

04174050 HURON RIVER AT DELHI MILLS, MI

LOCATION.--Lat 42°20'01", long 83°48'34", in SE¼ sec.2, T.2 S., R.5 E., Washtenaw County, Hydrologic Unit 04090005, at bridge on Delhi Road, 5.0 mi (8.0 km) northwest of Ann Arbor, 5.2 mi (8.4 km) downstream from Mill Creek, 5.1 mi (8.2 km) upstream from Barton Dam, and 60.0 mi (96.5 km) upstream from mouth.

DRAINAGE AREA.--699 mi² (1,810 km²).

PERIOD OF RECORD.--Water years 1971 to current year.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Washtenaw County Health Department.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	STAGE (FT ABOVE DATUM)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	BIOCHEMICAL OXYGEN DEMAND 5 DAY (MG/L)	COMPLETE COLIFORM (MPN)	FECAL COLIFORM (EC BROTH) (MPN)
NOV												
29...	1150	35.14	560	8.2	-7.0	.0	--	13.8	97	1.6	24000	750
JAN												
20...	1030	35.21	600	7.8	-12.0	.5	--	11.0	78	1.2	930	<30
MAR												
16...	1415	35.99	579	8.0	12.5	5.0	11	12.1	98	2.1	4600	<30
MAY												
19...	1115	35.43	529	8.2	24.5	20.5	--	8.4	94	.2	2100	390
JUL												
21...	1145	34.90	481	8.2	25.0	27.5	--	6.7	86	1.2	1500	430
SEP												
21...	1200	34.79	590	8.2	14.0	16.5	10	8.9	93	2.5	6400	390

DATE	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	CARBON DIOXIDE (CO2) (MG/L)
NOV											
29...	--	--	--	--	--	--	230	0	189	--	2.3
JAN											
20...	--	--	--	--	--	--	290	0	238	--	7.4
MAR											
16...	270	67	76	20	17	2.1	250	0	205	54	4.0
MAY											
19...	--	--	--	--	--	--	250	0	205	--	2.5
JUL											
21...	--	--	--	--	--	--	240	0	197	--	2.4
SEP											
21...	260	63	69	21	21	2.7	240	0	197	50	2.4

DATE	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)
NOV											
29...	--	--	--	--	--	.02	.01	--	.02	--	--
JAN											
20...	--	--	--	--	--	.23	.03	--	.35	--	--
MAR											
16...	35	.2	7.8	353	338	.68	.02	.68	.29	.71	1.0
MAY											
19...	--	--	--	--	--	.16	.01	--	.23	--	--
JUL											
21...	--	--	--	--	--	.23	.02	--	.44	--	--
SEP											
21...	40	.2	8.1	351	331	.21	.01	.22	.09	.46	.55

04174050 HURON RIVER AT DELHI MILLS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TOTAL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	TOTAL ORTHO PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)
NOV 29...	--	--	.01	.01	--	--	--	--	--	--
JAN 20...	--	--	.01	.00	--	--	--	--	--	--
MAR 16...	1.7	7.5	.04	.03	.02	--	--	--	60	--
MAY 19...	--	--	.01	.01	--	--	--	--	--	--
JUL 21...	--	--	.01	.01	--	--	--	--	--	--
SEP 21...	.77	3.4	.05	.01	.00	1	0	0	40	9

DATE	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED NICKEL (NI) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	TOTAL ORGANIC CARBON (C) (MG/L)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)	POLY-CHLO-RINATED NAPH-THA-LENES (UG/L)	TOTAL PCB (UG/L)	TOTAL ALDRIN (UG/L)	TOTAL CHLOR-DANE (UG/L)
NOV 29...	--	--	--	--	5.0	.00	.00	.0	.00	.0
JAN 20...	--	--	--	--	3.2	.00	.00	.0	.00	.0
MAR 16...	50	--	--	--	9.1	.00	.00	.0	.00	.0
MAY 19...	--	--	--	--	6.0	.00	.00	.0	.00	.0
JUL 21...	--	--	--	--	--	.00	.00	.0	.00	.0
SEP 21...	20	2	0	10	7.6	.00	.00	.0	.00	.0

DATE	TOTAL DDD (UG/L)	TOTAL DDE (UG/L)	TOTAL DDT (UG/L)	TOTAL DI-AZINON (UG/L)	TOTAL DI-ELDRIN (UG/L)	TOTAL ENDRIN (UG/L)	TOTAL ETHION (UG/L)	TOTAL HEPTA-CHLOR (UG/L)	TOTAL HEPTA-CHLOR EPOXIDE (UG/L)
NOV 29...	.00	.00	.00	.00	.00	.00	.00	.00	.00
JAN 20...	.00	.00	.00	.00	.00	.00	.00	.00	.00
MAR 16...	.00	.00	.00	.00	.00	.00	.00	.00	.00
MAY 19...	.00	.00	.00	.00	.00	.00	.00	.00	.00
JUL 21...	.00	.00	.00	.00	.00	.00	.00	.00	.00
SEP 21...	.00	.00	.00	.00	.00	.00	.00	.00	.00

DATE	TOTAL LINDANE (UG/L)	TOTAL MALA-THION (UG/L)	TOTAL METHYL TRI-THION (UG/L)	TOTAL PARA-THION (UG/L)	TOTAL TOX-APHENE (UG/L)	TOTAL TRI-THION (UG/L)	TOTAL 2,4-D (UG/L)	TOTAL 2,4,5-T (UG/L)	TOTAL SILVEX (UG/L)
NOV 29...	.00	.00	.00	.00	0	.00	.14	.00	.04
JAN 20...	.00	.00	.00	.00	0	.00	.09	.00	.00
MAR 16...	.00	.00	.00	.00	0	.00	.05	.00	.02
MAY 19...	.00	.00	.00	.00	0	.00	.22	.01	.00
JUL 21...	.00	.00	.00	.00	0	.00	.16	.01	.00
SEP 21...	.00	.00	.00	.00	0	.00	.10	.02	.01

04174500 HURON RIVER AT ANN ARBOR, MI

LOCATION.--Lat 42°17'10", long 83°44'00", in NW¼ sec.28, T.2 S., R.6 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 100 ft (30 m) upstream from bridge on Wall Street in Ann Arbor, 0.7 mi (1.1 km) downstream from Argo Dam, and 4.2 mi (6.8 km) upstream from Geddes Dam.

DRAINAGE AREA.--729 mi² (1,888 km²).

PERIOD OF RECORD.--February 1904 to current year. Monthly discharge only for some periods published in WSP 1307. Published as "at Geddes" February 1904 to December 1914 and as "at Barton" January 1914 to September 1940.

REVISED RECORDS.--WSP 874: 1938. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 744.81 ft (227.018 m) above mean sea level (levels by Michigan Department of Natural Resources). February 1904 to December 1914 at Geddes Dam, 4.2 mi (6.8 km) downstream, and January 1914 to September 1947, at Barton Dam, 2.6 mi (4.2 km) upstream, flow computed from records of operation of powerplants and records of depth of flow over dam and/or flow through undersluices.

REMARKS.--Records good. Diversion above station for Ann Arbor municipal supply had negligible effect on natural flow prior to 1955, figures of runoff adjusted since. Flow regulated by powerplants prior to May 1962, and since by occasional lake level control operations above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--73 years, 452 ft³/s (12.80 m³/s), 8.42 in/yr (214 mm/yr), adjusted for diversion since 1955.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 5,840 ft³/s (165 m³/s) Mar. 14, 1918; minimum daily, 4 ft³/s (0.11 m³/s) Aug. 2, Sept. 11, 1931 (plant leakage), but may be doubtful due to change in leakage.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,000 ft³/s (56.6 m³/s) June 18; maximum gage height, 14.74 ft (4.493 m) May 8; minimum daily discharge, 64 ft³/s (1.81 m³/s) Sept. 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	162	368	309	220	194	455	956	1010	178	264	148	113
2	197	322	284	220	242	425	1050	587	174	207	113	128
3	184	410	214	220	227	387	1280	527	139	153	93	113
4	181	340	284	210	217	721	1180	789	153	207	93	111
5	187	136	300	214	210	1150	1160	768	245	168	134	113
6	368	210	280	200	200	986	1140	658	284	162	111	116
7	485	331	280	210	200	789	1130	646	280	145	109	111
8	150	611	242	207	200	708	1020	622	187	178	121	86
9	184	401	261	207	200	795	845	420	238	214	109	118
10	207	288	264	200	200	823	837	340	197	174	171	109
11	224	280	227	200	194	789	782	238	257	178	142	89
12	238	313	234	190	194	823	689	559	245	142	148	64
13	217	430	234	190	197	902	576	366	272	162	109	136
14	253	363	238	180	210	880	425	238	168	106	153	174
15	231	340	224	180	210	837	485	257	200	121	106	111
16	194	309	234	180	210	789	576	284	184	178	111	187
17	242	245	227	180	224	755	554	268	217	148	113	168
18	272	261	231	180	217	761	485	391	391	181	111	171
19	184	363	227	180	214	809	276	373	354	611	111	288
20	207	349	234	180	207	782	485	224	253	268	109	280
21	238	345	190	181	207	728	506	234	387	194	109	171
22	309	368	234	187	221	543	406	349	313	221	118	190
23	368	313	238	197	261	611	775	250	190	200	136	168
24	227	284	214	178	527	593	1000	220	194	305	118	238
25	165	300	245	174	581	593	1020	200	187	204	113	210
26	257	327	231	165	599	548	1240	200	207	194	113	354
27	425	359	204	187	565	605	1120	168	187	139	113	280
28	207	359	238	197	581	823	1070	210	187	156	116	349
29	210	331	230	180	---	1170	1210	153	187	162	116	168
30	224	292	230	180	---	1390	809	190	268	150	106	214
31	253	---	260	178	---	880	---	162	---	111	111	---
TOTAL	7450	9948	7542	5952	7789	23850	25087	11901	6923	6003	3684	5128
MEAN	240	332	243	192	275	769	836	384	231	194	119	171
MAX	485	611	309	220	599	1390	1280	1010	391	611	171	354
MIN	150	136	190	165	194	387	276	153	139	106	93	64
MEAN+	262	353	263	212	294	789	858	408	255	218	139	192
CFSM+	.36	.48	.36	.29	.40	1.08	1.18	.56	.35	.30	.19	.26
IN+	.42	.54	.42	.34	.42	1.25	1.31	.65	.39	.34	.22	.29

CAL YR 1976 TOTAL 235892 MEAN 645 MAX 3510 MIN 88 MEAN+ 667 CFSM+ .91 IN+ 12.45
WTR YR 1977 TOTAL 121173 MEAN 332 MAX 1390 MIN 64 MEAN+ 353 CFSM+ .48 IN+ 6.58
+Adjusted for diversion for municipal supply; record furnished by City of Ann Arbor.

04174800 HURON RIVER AT YPSILANTI, MI

LOCATION.--Lat 42°14'57", long 83°36'45", in SW¼ sec.4, T.3 S., R.7 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 30 ft (9 m) downstream from bridge on Forest Avenue in Ypsilanti, 4.9 mi (7.9 km) downstream from Geddes Dam and 5.6 mi (9.0 km) upstream from Ford Dam, and at mile 42.8 (68.9 km).

DRAINAGE AREA.--807 mi² (2,090 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1974 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 700 ft (213 m) from topographic map (nearest 5 ft).

REMARKS.--Water-discharge records good. Considerable regulation caused by many dams above station; storage capacity is small.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,300 ft³/s (122 m³/s) Mar. 5, 1976, gage height, 12.50 ft (3.810 m); minimum, 14 ft³/s (0.40 m³/s) June 15, 1976, gage height, 6.45 ft (1.966 m); minimum daily, 81 ft³/s (2.29 m³/s) Aug. 1, 1975.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,900 ft³/s (53.8 m³/s) Apr. 25, gage height, 10.36 ft (3.158 m); minimum, 78 ft³/s (2.21 m³/s) Sept. 15, gage height, 6.97 ft (2.124 m); minimum daily, 116 ft³/s (3.29 m³/s) Aug. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	180	370	338	254	247	630	1130	1210	256	414	192	147
2	210	355	325	248	270	589	1310	834	250	288	120	158
3	200	454	255	240	264	532	1500	799	250	220	165	153
4	200	412	296	235	249	1130	1390	1030	230	261	116	143
5	205	193	325	230	231	1420	1410	1060	427	253	204	152
6	400	228	350	225	228	1250	1340	955	496	231	176	149
7	500	342	293	230	219	1010	1290	917	430	246	170	163
8	165	607	276	230	232	876	1190	981	259	209	176	141
9	200	450	292	220	218	961	1020	700	320	320	133	155
10	225	335	307	220	226	1010	995	498	346	212	298	168
11	240	323	271	220	210	984	964	405	304	234	246	130
12	250	342	269	210	215	1010	876	782	393	259	214	137
13	240	464	259	210	220	1120	749	684	441	206	153	275
14	270	419	255	200	236	1100	572	406	221	171	176	196
15	240	385	259	200	244	1020	615	432	300	179	145	214
16	215	369	254	200	238	1010	742	434	227	183	164	255
17	270	308	254	200	242	906	726	373	379	227	138	261
18	275	294	260	200	230	943	661	482	507	249	139	295
19	205	396	248	200	230	966	424	607	442	826	143	277
20	230	382	265	200	230	968	628	286	348	345	139	435
21	275	392	221	200	230	932	687	333	430	289	147	241
22	266	389	252	210	258	798	597	480	375	272	183	236
23	366	351	272	210	321	786	1110	390	280	252	146	279
24	338	322	231	200	866	790	1330	364	238	319	209	320
25	234	312	267	190	853	792	1330	303	257	296	149	350
26	275	363	258	100	714	749	1650	248	273	236	138	500
27	469	426	242	210	801	767	1320	289	216	185	143	400
28	247	391	268	200	755	1300	1280	267	251	171	141	500
29	236	369	255	190	---	1540	1310	289	312	192	148	260
30	261	306	242	180	---	1620	991	276	334	192	147	300
31	290	---	293	175	---	1130	---	260	---	132	147	---
TOTAL	8177	11049	8452	6517	9477	30639	31137	17374	9702	8069	5105	7390
MEAN	264	368	273	210	338	988	1038	560	323	260	165	246
MAX	500	607	350	254	866	1620	1650	1210	507	826	298	500
MIN	165	193	221	175	210	532	424	248	216	132	116	130
CFSM	.33	.46	.34	.26	.42	1.22	1.29	.69	.40	.32	.20	.31
IN.	.38	.51	.39	.30	.44	1.41	1.44	.80	.45	.37	.24	.34

CAL YR 1976 TOTAL 258833 MEAN 707 MAX 3920 MIN 125 CFSM .88 IN 11.93
WTR YR 1977 TOTAL 153088 MEAN 419 MAX 1650 MIN 116 CFSM .52 IN 7.06

04174800 HURON RIVER AT YPSILANTI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1971 to current year.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Washtenaw County Health Department.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	BIOCHEMICAL OXYGEN DEMAND 5 DAY (MG/L)	COMPLETE COLIFORM (MPN)	FECAL COLIFORM (EC BROTH) (MPN)
NOV												
30...	0745	268	570	8.1	-11.0	.0	--	14.2	100	.9	750	40
JAN												
21...	0810	200	650	7.7	-6.5	.5	--	13.0	93	.5	430	<30
MAR												
18...	0830	906	602	8.3	.5	5.0	11	12.4	99	4.9	4600	90
MAY												
20...	0830	354	572	7.8	20.0	22.0	--	6.8	79	4.7	230	<30
JUL												
22...	0745	272	550	7.9	17.0	25.0	--	6.6	79	2.1	4600	90
SEP												
23...	0840	265	602	7.9	15.0	17.5	7	7.5	80	6.1	640	30

DATE	HARDNESS (CA+MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	CARBON DIOXIDE (CO2) (MG/L)
NOV											
30...	--	--	--	--	--	--	250	0	205	--	3.2
JAN											
21...	--	--	--	--	--	--	290	0	238	--	9.3
MAR											
18...	250	45	68	20	21	2.6	258	0	205	57	2.0
MAY											
20...	--	--	--	--	--	--	260	0	213	--	6.6
JUL											
22...	--	--	--	--	--	--	210	0	172	--	4.2
SEP											
23...	260	80	66	22	29	3.4	220	0	180	58	4.4

04174800 HURON RIVER AT YPSILANTI, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (PG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITRO-GEN (N) (MG/L)	TOTAL ORGANIC NITRO-GEN (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)
NOV 30...	--	--	--	--	--	.03	.04	--	.05	--	--	--
JAN 21...	--	--	--	--	--	.33	.02	--	1.4	--	--	--
MAR 18...	42	.2	6.5	353	344	.73	.04	.75	.79	.71	1.5	2.3
MAY 20...	--	--	--	--	--	.35	.10	--	1.0	--	--	--
JUL 22...	--	--	--	--	--	.71	.07	--	.55	--	--	--
SEP 23...	55	.2	7.4	373	354	.78	.22	.98	.95	.75	1.7	2.7

DATE	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	TOTAL ORTHO PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ARSENIC (AS) (LG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
NOV 30...	--	.07	.07	--	--	--	--	--	--	--	--	.00
JAN 21...	--	.02	.01	--	--	--	--	--	--	--	--	.00
MAR 18...	10	.08	.02	.01	--	--	--	80	--	50	--	.00
MAY 20...	--	.03	.02	--	--	--	--	--	--	--	--	.00
JUL 22...	--	.03	.03	--	--	--	--	--	--	--	--	.00
SEP 23...	12	.11	.03	.01	1	0	0	10	8	30	<.5	.00

04174900 FORD LAKE NEAR RAWSONVILLE, MI

LOCATION.--Lat 42°12'22", long 83°33'28", in SW¼ sec.24, T.3 S., R.7 E., Washtenaw County, Hydrologic Unit 04090005, at upstream side of Ford Dam at Rawsonville Road, 1 mi (1.6 km) west of Rawsonville, 3.0 mi (4.8 km) upstream from Belleville Dam, 3.5 mi (5.6 km) southeast of Ypsilanti, 4.2 mi (6.8 km) downstream from gaging station at Ypsilanti, and 37.4 mi (60.2 km) upstream from mouth.

DRAINAGE AREA.--814 mi² (2,110 km²).

PERIOD OF RECORD.--Water years 1971 to current year.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Washtenaw County Health Department.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	BIOCHEMICAL OXYGEN DEMAND 5 DAY (MG/L)	COMPLETE COLIFORM (MPN)	FECAL COLIFORM (EC BROTH) (MPN)
NOV 30...	0845	600	8.3	-11.0	.0	--	13.1	92	2.8	430	<30
MAR 18...	1030	561	7.9	1.0	3.5	10	10.8	83	1.7	11000	<30
MAY 20...	0930	545	8.3	25.0	20.0	--	9.9	111	3.9	<30	<30
JUL 22...	0830	490	7.7	20.0	26.0	--	5.2	63	6.4	230	230
SEP 23...	0945	613	8.0	17.5	18.5	10	5.2	57	3.9	110	70

DATE	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	CARBON DIOXIDE (CO2) (MG/L)
NOV 30...	--	--	--	--	--	--	250	0	205	--	2.0
MAR 18...	240	55	68	18	22	2.9	230	0	189	53	4.6
MAY 20...	--	--	--	--	--	--	220	0	180	--	1.8
JUL 22...	--	--	--	--	--	--	140	0	115	--	4.5
SEP 23...	230	82	57	22	33	3.8	180	0	148	64	2.9

04174900 FORD LAKE NEAR RAWSONVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITRO-GEN (N) (MG/L)
NOV 30...	--	--	--	--	--	.04	.05	--	.05
MAR 18...	42	.2	6.3	332	330	.80	.04	--	.75
MAY 20...	--	--	--	--	--	.17	.02	--	.53
JUL 22...	--	--	--	--	--	.12	.01	--	.50
SEP 23...	64	.2	4.9	360	340	.50	.10	.59	.87

DATE	TOTAL ORGANIC NITRO-GEN (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	TOTAL ORTHO PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)
NOV 30...	--	--	--	--	.02	.02	--	--	--
MAR 18...	.75	1.5	2.3	10	.07	.03	.02	--	--
MAY 20...	--	--	--	--	.03	.02	--	--	--
JUL 22...	--	--	--	--	.01	.01	--	--	--
SEP 23...	.73	1.6	2.2	9.7	.08	.04	.03	1	0

DATE	DIS-SOLVED COBALT (CO) (UG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	DIS-SOLVED NICKEL (NI) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
NOV 30...	--	--	--	--	--	--	--	--	.00
MAR 18...	--	100	--	50	--	--	--	--	.00
MAY 20...	--	--	--	--	--	--	--	--	.00
JUL 22...	--	--	--	--	--	--	--	--	.00
SEP 23...	0	0	7	10	<.5	26	0	10	.00

04175340 STONY CREEK AT OAKVILLE, MI

LOCATION.--Lat 42°05'05", long 83°34'43", in SE¼ SE¼ sec.34, T.4 S., R.7 E., Washtenaw County, Hydrologic Unit 04100001, on left bank at downstream side of bridge on Tuttle Hill Road, 300 ft (91 m) downstream from Paint Creek, and 0.2 mi (0.3 km) northeast of Oakville.

DRAINAGE AREA.--68.0 mi² (176.1 km²).

PERIOD OF RECORD.--January 1970 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 645 ft (197 m) from topographic map (nearest 5 ft). Prior to July 31, 1970, non-recording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--7 years, 44.3 ft³/s (1.255 m³/s), 8.85 in/yr (225 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 840 ft³/s (23.8 m³/s) Feb. 17, 1976, gage height, 8.20 ft (2.499 m); maximum gage height, 8.31 ft (2.533 m) Feb. 20, 1971, backwater from ice; minimum discharge, 2.7 ft³/s (0.076 m³/s) Aug. 24, 1971, gage height, 1.00 ft (0.305 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft³/s (8.50 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 5	1100	400	11.3	*a7.96	2.426	Apr. 24	0600	484	13.7	7.37	2.246
Mar. 29	0700	*509	14.4	7.44	2.268	Apr. 26	1100	320	9.06	6.73	2.051

a Ice jam.

Minimum discharge, 4.3 ft³/s (0.12 m³/s) Aug. 18, gage height, 1.07 ft (0.326 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	10	18	14	12	11	60	74	44	23	22	8.4	8.2
2	9.9	15	14	12	11	60	123	39	17	15	6.1	15
3	9.7	14	11	12	11	60	145	36	15	12	5.6	12
4	9.5	13	12	12	11	110	95	41	13	12	8.3	7.6
5	9.9	13	13	12	11	350	144	53	26	38	8.0	7.0
6	18	13	13	12	11	180	95	44	73	20	9.7	7.2
7	35	13	13	12	11	123	75	33	64	12	11	6.7
8	21	13	13	12	11	108	64	27	34	12	8.3	6.1
9	17	13	13	12	11	110	55	24	40	12	7.6	5.9
10	14	13	13	12	11	97	52	22	32	10	7.5	5.9
11	13	14	13	12	11	86	48	21	25	8.8	13	5.8
12	10	15	13	12	11	73	42	20	25	12	12	5.3
13	10	15	12	11	11	80	39	19	23	12	9.3	11
14	11	15	12	11	11	94	36	17	20	9.6	7.9	19
15	10	16	12	11	12	70	33	16	17	9.0	6.1	10
16	9.7	17	12	11	12	58	31	16	15	7.4	6.3	15
17	9.8	16	12	11	12	51	30	15	18	9.2	6.0	14
18	10	13	12	11	13	54	30	18	43	8.9	5.7	14
19	11	13	12	11	13	57	29	17	29	13	5.2	17
20	13	13	12	11	14	69	30	15	19	20	5.5	22
21	13	12	13	11	15	64	31	14	16	12	6.7	13
22	13	11	15	11	18	90	39	13	14	12	12	10
23	14	12	14	11	23	91	222	18	12	11	9.3	11
24	16	14	12	11	160	72	415	14	12	9.2	13	13
25	18	12	12	11	185	72	189	12	12	9.8	10	15
26	16	14	12	11	100	84	276	11	10	10	8.9	29
27	15	28	12	11	85	94	133	12	11	8.0	8.2	41
28	14	25	12	11	65	297	82	11	12	7.3	7.9	22
29	14	17	12	11	---	479	63	11	14	7.6	8.0	16
30	14	15	12	11	---	254	51	11	13	8.0	9.4	15
31	17	---	12	11	---	101	---	12	---	7.2	8.4	---
TOTAL	425.5	445	389	353	881	3648	2771	676	697	377.0	259.3	399.7
MEAN	13.7	14.8	12.5	11.4	31.5	118	92.4	21.8	23.2	12.2	8.36	13.3
MAX	35	28	15	12	185	479	415	53	73	38	13	41
MIN	9.5	11	11	11	11	51	29	11	10	7.2	5.2	5.3
CFSM	.20	.22	.18	.17	.46	1.74	1.36	.32	.34	.18	.12	.20
IN.	.23	.24	.21	.19	.48	2.00	1.52	.37	.38	.21	.14	.22

CAL YR 1976 TOTAL 19026.1 MEAN 52.0 MAX 790 MIN 5.2 CFSM .77 IN 10.41
WTR YR 1977 TOTAL 11321.5 MEAN 31.0 MAX 479 MIN 5.2 CFSM .46 IN 6.19

04175597 RIVER RAISIN NEAR SHARONVILLE, MI

LOCATION.--Lat 42°10'04", long 84°07'21", in SW¼ sec.31, T.3 S., R.3 E., Washtenaw County, Hydrologic Unit 04100002, at bridge on Sharon Valley Road, 2.0 mi (3.2 km) southwest of Sharonville, 4.0 mi (6.4 km) upstream from gaging station near Manchester, 4.0 mi (6.4 km) northwest of Manchester, and 113 mi (182 km) upstream from mouth.

DRAINAGE AREA.--121 mi² (313 km²).

PERIOD OF RECORD.--Water years 1971 to current year.

REMARKS.--Estimates of water discharge are based on streamflow records at gaging station near Manchester.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Washtenaw County Health Department.

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	BIOCHEMICAL OXYGEN DEMAND 5 DAY (MG/L)	COMPLETE COLIFORM (MPN)	FECAL COLIFORM (EC BROTH) (MPN)
NOV												
30...	1255	E30	540	7.9	-8.0	.0	--	12.4	87	.6	4600	40
JAN												
21...	1130	E25	520	7.7	-1.0	.0	--	9.8	69	3.2	1500	<30
MAR												
17...	1155	E190	417	8.1	7.0	6.0	12	10.4	87	2.0	930	<30
MAY												
20...	1330	E38	450	8.2	31.0	23.5	--	8.4	101	2.4	90	40
JUL												
22...	1145	E20	424	8.0	19.0	20.5	--	8.3	92	2.4	2400	2400
SEP												
22...	1145	E45	488	8.2	14.5	16.0	15	8.1	84	2.3	750	70

DATE	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	CARBON DIOXIDE (CO2) (MG/L)
NOV											
30...	--	--	--	--	--	--	290	0	238	--	5.8
JAN											
21...	--	--	--	--	--	--	290	0	238	--	9.3
MAR											
17...	200	36	54	15	7.6	1.9	200	0	164	34	2.5
MAY											
20...	--	--	--	--	--	--	230	0	189	--	2.3
JUL											
22...	--	--	--	--	--	--	250	0	205	--	4.0
SEP											
22...	250	45	66	20	9.0	1.8	250	0	205	27	2.5

E--ESTIMATED VALUE

04175597 RIVER RAISIN NEAR SHARONVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITRO-GEN (N) (MG/L)	TOTAL ORGANIC NITRO-GEN (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)
NOV												
30...	--	--	--	--	--	.06	.02	--	.01	--	--	--
JAN												
21...	--	--	--	--	--	1.1	.02	--	.42	--	--	--
MAR												
17...	17	.2	5.7	246	235	.26	.01	.27	.07	.73	.80	1.1
MAY												
20...	--	--	--	--	--	.23	.01	--	.15	--	--	--
JUL												
22...	--	--	--	--	--	.83	.03	--	.52	--	--	--
SEP												
22...	20	.1	6.6	287	276	.49	.00	.50	.03	.47	.50	.99

DATE	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	TOTAL ORTHO PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
NOV												
30...	--	.03	.03	--	--	--	--	--	--	--	--	.00
JAN												
21...	--	.01	.00	--	--	--	--	--	--	--	--	.00
MAR												
17...	4.7	.03	.01	.01	--	--	--	120	--	20	--	.00
MAY												
20...	--	.02	.02	--	--	--	--	--	--	--	--	.00
JUL												
22...	--	.01	.01	--	--	--	--	--	--	--	--	.00
SEP												
22...	4.4	.13	.00	.00	1	0	0	40	5	30	.0	.00

04175600 RIVER RAISIN NEAR MANCHESTER, MI

LOCATION.--Lat 42°10'05", long 84°04'34", in NE¼ SE¼ sec.33, T.3 S., R.3 E., Washtenaw County, Hydrologic Unit 04100002, on left bank 8 ft (2 m) downstream from bridge on Sharon Valley Road, and 2.5 mi (4.0 km) northwest of Manchester.

DRAINAGE AREA.--132 mi² (342 km²).

PERIOD OF RECORD.--January 1970 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 900 ft (274 m) from topographic map (nearest 10 ft). Prior to July 30, 1970, non-recording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, July 2 to Sept. 18, which are poor. Occasional regulation by many dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--7 years, 102 ft³/s (2.889 m³/s), 10.49 in/yr (266 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 565 ft³/s (16.0 m³/s) Mar. 5, 1976, gage height, 6.46 ft (1.969 m); minimum, 4.5 ft³/s (0.13 m³/s) Nov. 29, 1971; minimum gage height, 1.27 ft (0.387 m) Nov. 14, 1976.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 280 ft³/s (7.93 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 5	0100	301	8.52	5.17	1.576	Mar. 29	1400	*349	9.88	*5.39	1.643

Minimum discharge not determined, minimum daily, 9.6 ft³/s (0.27 m³/s) Oct. 27; minimum gage height, 1.27 ft (0.387 m) Nov. 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	22	40	23	30	23	120	245	168	42	30	13	22
2	22	22	36	30	23	115	244	153	41	25	12	24
3	20	22	35	30	23	114	265	144	38	21	13	23
4	21	44	34	30	23	228	276	137	30	23	15	22
5	18	41	33	30	23	291	271	138	15	23	16	21
6	29	19	32	30	23	261	261	134	17	20	16	20
7	44	45	32	30	23	232	246	120	22	18	16	20
8	42	24	32	30	23	211	233	107	28	18	16	19
9	38	22	31	29	23	215	216	97	33	19	18	18
10	35	37	31	28	23	221	204	84	27	20	20	18
11	29	37	31	28	23	216	191	72	30	20	22	33
12	29	19	31	27	23	219	179	69	37	20	24	32
13	30	39	31	27	23	237	165	49	31	18	22	28
14	36	17	31	27	23	232	152	43	28	17	21	24
15	28	38	30	27	23	230	136	46	28	17	20	24
16	31	16	30	27	23	225	129	47	26	18	18	26
17	23	37	30	27	23	206	86	52	23	19	18	30
18	13	33	30	27	23	197	80	56	20	20	17	56
19	27	23	30	27	23	190	80	50	19	18	17	66
20	20	39	30	27	24	196	89	46	19	17	17	66
21	18	18	30	27	24	192	96	44	17	20	17	57
22	30	38	30	27	28	190	104	42	16	24	19	50
23	37	19	30	27	50	183	156	39	15	19	22	41
24	25	42	30	27	125	176	188	37	15	18	25	45
25	21	22	30	27	180	168	202	35	16	17	23	54
26	36	46	30	27	150	167	261	32	18	16	22	74
27	9.6	50	30	27	140	177	246	30	18	16	21	138
28	36	70	30	26	125	242	219	29	18	16	21	126
29	23	54	30	25	---	330	203	29	20	15	20	95
30	21	40	30	24	---	314	186	22	23	15	20	76
31	43	---	30	24	---	274	---	23	---	14	20	---
TOTAL	856.6	1013	953	856	1283	6569	5609	2174	730	591	581	1348
MEAN	27.6	33.8	30.7	27.6	45.8	212	187	70.1	24.3	19.1	18.7	44.9
MAX	44	70	36	30	180	330	276	168	42	30	25	138
MIN	9.6	16	23	24	23	114	80	22	15	14	12	18
CFSM	.21	.26	.23	.21	.35	1.61	1.42	.53	.18	.15	.14	.34
IN.	.24	.29	.27	.24	.36	1.85	1.58	.61	.21	.17	.16	.38

CAL YR 1976 TOTAL 39140.1 MEAN 107 MAX 550 MIN 9.5 CFSM .81 IN 11.03
WTR YR 1977 TOTAL 22563.6 MEAN 61.8 MAX 330 MIN 9.6 CFSM .47 IN 6.36

04175610 RIVER RAISIN AT MANCHESTER, MI

LOCATION.--Lat 42°08'52", long 84°00'56", in SE¼ sec.1, T.4 S., R.3 E., Washtenaw County, Hydrologic Unit 04100002, at bridge on Austin Road, 1.0 mi (1.6 km) east of Manchester, 0.6 mi (1.0 km) downstream from Ford Dam, 5.3 mi (8.5 km) downstream from gaging station near Manchester, and 104 mi (167 km) upstream from mouth.

DRAINAGE AREA.--148 mi² (383 km²).

PERIOD OF RECORD.--Water years 1971 to current year.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Washtenaw County Health Department.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	STAGE (FT ABOVE DATUM)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	BIOCHEMICAL OXYGEN DEMAND 5 DAY (MG/L)	COMPLETE COLIFORM (MPN)	FECAL COLIFORM (EC BROTH) (MPN)
NOV 30...	1220	38.56	545	8.0	-4.5	.0	--	14.0	99	.1	4600	430
JAN 21...	1045	--	580	7.8	-3.5	.0	--	10.2	72	1.4	930	430
MAR 17...	1400	39.84	426	8.2	12.0	7.0	17	11.1	93	3.0	11000	430
MAY 20...	1245	38.55	489	8.2	30.0	24.5	--	8.8	107	1.8	930	40
JUL 22...	1100	38.00	505	7.8	21.5	23.0	--	5.1	59	2.9	11000	930
SEP 22...	1250	37.82	524	8.1	17.0	17.0	15	8.8	93	2.7	2000	230

DATE	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	CARBON DIOXIDE (CO2) (MG/L)
NOV 30...	--	--	--	--	--	--	270	0	221	--	4.3
JAN 21...	--	--	--	--	--	--	310	0	254	--	7.9
MAR 17...	200	28	57	15	7.4	1.9	210	0	172	34	2.1
MAY 20...	--	--	--	--	--	--	260	0	213	--	2.6
JUL 22...	--	--	--	--	--	--	280	0	230	--	7.1
SEP 22...	260	39	70	20	10	2.0	270	0	221	30	3.4

04175610 RIVER RAISIN AT MANCHESTER, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITRO-GEN (N) (MG/L)	TOTAL ORGANIC NITRO-GEN (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)
NOV												
30...	--	--	--	--	--	.06	.02	--	.02	--	--	--
JAN												
21...	--	--	--	--	--	.60	.03	--	.46	--	--	--
MAR												
17...	16	.2	6.2	257	243	.31	.01	.32	.08	.72	.80	1.1
MAY												
20...	--	--	--	--	--	.21	.01	--	.21	--	--	--
JUL												
22...	--	--	--	--	--	.74	.05	--	.48	--	--	--
SEP												
22...	21	.2	7.8	298	297	.53	.02	.55	.12	.47	.59	1.1

DATE	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	TOTAL ORTHO PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
NOV												
30...	--	.06	.05	--	--	--	--	--	--	--	--	.00
JAN												
21...	--	.06	.01	--	--	--	--	--	--	--	--	.00
MAR												
17...	5.0	.05	.03	.01	--	--	--	120	--	30	--	.00
MAY												
20...	--	.02	.00	--	--	--	--	--	--	--	--	.00
JUL												
22...	--	.05	.04	--	--	--	--	--	--	--	--	.00
SEP												
22...	5.0	.06	.02	.01	1	0	0	40	0	10	.0	.00

04175700 RIVER RAISIN NEAR TECUMSEH, MI

LOCATION.--Lat 41°56'35", long 83°56'45", in NE¼ sec.21, T.6 S., R.4 E., Lenawee County, Hydrologic Unit 04100002, on right bank 12 ft (4 m) downstream from former bridge site on North Raisin Center Highway, 3.4 mi (5.5 km) upstream from South Branch River Raisin, and 4.5 mi (7.2 km) south of Tecumseh.

DRAINAGE AREA.--267 mi² (692 km²).

PERIOD OF RECORD.--September 1956 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 707.0 ft (215.49 m) above mean sea level.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplant 5.5 mi (8.8 km) above station prior to June 27, 1968. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 179 ft³/s (5.069 m³/s), 9.10 in/yr (231 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,920 ft³/s (82.7 m³/s) June 26, 1968, gage height, 12.66 ft (3.859 m); minimum, 6.4 ft³/s (0.18 m³/s) Aug. 26, 1964, gage height, 2.57 ft (0.783 m); minimum daily, 8.3 ft³/s (0.24 m³/s) Oct. 30, 1965.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 700 ft³/s (19.8 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 4	1800	732	20.7	8.98	2.737	Mar. 29	0800	*772	21.9	*9.08	2.768

Minimum daily discharge, 30 ft³/s (0.85 m³/s) Sept. 24; minimum gage height, 3.46 ft (1.055 m), Sept. 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	98	92	95	79	70	210	497	322	74	87	46	62
2	76	98	92	79	70	193	464	290	76	78	43	80
3	71	96	90	79	70	185	486	260	74	70	42	81
4	68	84	88	79	70	474	475	238	68	77	44	70
5	70	85	86	79	70	728	505	241	78	79	58	67
6	98	94	85	79	70	718	494	228	92	72	54	65
7	107	90	84	79	70	592	442	215	88	69	55	63
8	101	87	83	79	70	486	385	201	77	72	55	62
9	101	99	83	76	70	465	361	182	102	63	55	61
10	99	70	83	75	75	464	333	170	115	62	64	60
11	108	79	82	75	80	431	310	161	115	67	69	56
12	108	89	82	75	85	405	289	141	121	69	81	108
13	89	85	82	75	90	425	270	139	95	63	81	101
14	84	77	81	75	92	429	215	132	96	57	75	81
15	77	85	81	75	90	405	216	117	94	56	68	81
16	82	82	80	75	86	375	211	111	88	60	64	82
17	79	69	80	75	82	342	201	111	87	65	64	90
18	80	72	80	75	80	343	193	116	115	65	57	115
19	77	83	80	75	78	325	184	100	140	63	55	120
20	80	83	80	74	78	315	177	108	115	57	56	119
21	81	79	79	72	78	310	165	93	100	57	56	108
22	79	82	79	70	80	324	183	103	91	69	56	101
23	75	81	79	70	110	320	331	103	85	58	70	76
24	92	82	79	70	220	305	653	98	80	54	83	30
25	108	83	79	70	400	289	585	95	80	57	75	67
26	94	95	79	70	290	291	599	90	77	56	76	131
27	37	120	79	70	250	310	559	86	73	54	73	145
28	77	115	79	70	230	455	483	83	70	53	68	144
29	69	105	79	70	---	744	427	80	69	59	68	154
30	83	100	79	70	---	663	344	76	73	45	70	149
31	88	---	79	70	---	594	---	74	---	49	62	---
TOTAL	2636	2641	2546	2304	3204	12915	11037	4564	2708	1962	1943	2729
MEAN	85.0	88.0	82.1	74.3	114	417	368	147	90.3	63.3	62.7	91.0
MAX	108	120	95	79	400	744	653	322	140	87	83	154
MIN	37	69	79	70	70	185	165	74	68	45	42	30
CFSM	.32	.33	.31	.28	.43	1.56	1.38	.55	.34	.24	.24	.34
IN.	.37	.37	.35	.32	.45	1.80	1.54	.64	.38	.27	.27	.38

CAL YR 1976 TOTAL 83827 MEAN 229 MAX 1360 MIN 37 CFSM .86 IN 11.68
WTR YR 1977 TOTAL 51189 MEAN 140 MAX 744 MIN 30 CFSM .52 IN 7.13

04176000 RIVER RAISIN NEAR ADRIAN, MI

LOCATION.--Lat 41°54'15", long 83°58'50", in NW¼ sec.5, T.7 S., R.4 E., Lenawee County, Hydrologic Unit 04100002, on right bank 10 ft (3 m) downstream from bridge on Academy Road, 1.7 mi (2.7 km) east of Adrian, and 2.6 mi (4.2 km) downstream from South Branch River Raisin.

DRAINAGE AREA.--463 mi² (1,199 km²).

PERIOD OF RECORD.--October 1953 to current year. Records for October 1930 to August 1931, October 1932 to April 1938, published as "Raisin River" in WSP 714, 744, 759, 784, 804, 824, and 854, have been found to be unreliable and should not be used.

REVISED RECORDS.--See PERIOD OF RECORD. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 693.2 ft (211.29 m) above mean sea level.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplant at Tecumseh, 11 mi (18 km) above station, prior to June 27, 1968. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--24 years, 310 ft³/s (8.779 m³/s), 9.09 in/yr (231 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,580 ft³/s (158 m³/s) Apr. 30, 1956, gage height, 14.87 ft (4.532 m), from rating curve extended above 4,000 ft³/s (113 m³/s); minimum, 18 ft³/s (0.51 m³/s) Aug. 10, 1964, gage height, 1.33 ft (0.405 m); minimum daily, 25 ft³/s (0.71 m³/s) Oct. 26, 1965.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,400 ft³/s (39.6 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 5	2400	*2,460	69.7	*12.15	3.703
Mar. 30	0800	1,790	50.7	11.00	3.353
Apr. 25	1800	1,720	48.7	10.77	3.283

Minimum discharge, 58 ft³/s (1.64 m³/s) Aug. 4, gage height, 2.29 ft (0.698 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	146	123	130	110	90	370	1190	592	132	146	63	86
2	100	135	130	110	90	300	944	522	128	116	61	103
3	91	133	125	110	90	305	976	475	129	103	60	112
4	88	125	120	110	90	842	973	453	119	108	59	98
5	88	113	120	110	90	2100	937	428	131	113	76	91
6	144	128	115	110	92	2240	917	440	152	107	75	90
7	169	129	115	110	95	1600	832	418	151	94	90	88
8	139	114	115	105	100	1110	703	409	132	102	80	86
9	135	144	110	105	105	846	629	368	174	90	78	84
10	130	101	110	100	110	803	571	337	181	83	116	85
11	129	108	110	100	120	742	530	321	181	85	116	79
12	182	118	110	100	125	671	499	297	187	100	145	86
13	137	119	110	100	128	663	446	275	168	91	124	183
14	142	110	110	100	128	668	411	268	146	81	111	132
15	106	112	110	100	128	612	340	244	149	77	99	115
16	102	117	110	100	128	548	336	230	137	78	92	132
17	101	102	110	100	128	512	328	225	148	83	91	125
18	100	100	110	100	128	503	316	232	190	87	83	151
19	103	112	110	100	128	492	305	207	205	99	77	196
20	109	115	110	100	128	499	301	215	181	83	76	189
21	106	110	110	100	135	522	286	190	148	75	77	175
22	108	113	110	98	140	548	310	191	137	87	80	161
23	99	112	110	96	160	577	636	191	126	82	93	145
24	128	112	110	94	430	573	1190	183	117	72	152	80
25	140	111	110	92	1200	557	1660	174	123	77	114	86
26	151	138	110	90	800	556	1660	163	112	75	112	178
27	81	182	110	90	560	602	1420	153	105	72	105	235
28	101	170	110	90	450	863	1120	144	105	70	97	225
29	102	150	110	90	---	1470	875	139	103	69	94	224
30	109	140	110	90	---	1760	719	132	110	78	98	223
31	129	---	110	90	---	1560	---	130	---	66	91	---
TOTAL	3695	3696	3500	3100	6096	26014	22360	8746	4307	2749	2885	4043
MEAN	119	123	113	100	218	839	745	282	144	88.7	93.1	135
MAX	182	182	130	110	1200	2240	1660	592	205	146	152	235
MIN	81	100	110	90	90	300	286	130	103	66	59	79
CFSM	.26	.27	.24	.22	.47	1.81	1.61	.61	.31	.19	.20	.29
IN.	.30	.30	.28	.25	.49	2.09	1.80	.70	.35	.22	.23	.32

CAL YR 1976	TOTAL	140744	MEAN 385	MAX 3410	MIN 61	CFSM .83	IN 11.31	
WTR YR 1977	TOTAL	91191	MEAN 250	MAX 2240	MIN 59	CFSM .54	IN 7.33	

04176365 SALINE RIVER ABOVE SALINE, MI

LOCATION.--Lat 42°10'16", long 83°49'32", in SW¼ sec.34, T.3 S., R.5 E., Washtenaw County, Hydrologic Unit 04100002, at bridge on Dell Road, 2.5 mi (4.0 km) east of Saline, 6.9 mi (11.1 km) upstream from gaging station near Saline, 33 mi (53 km) upstream from River Raisin.

DRAINAGE AREA.--46 mi² (119 km²), approximately.

PERIOD OF RECORD.--Water years 1971 to current year.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Washtenaw County Health Department.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	STAGE (FT ABOVE DATUM)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	BIOCHEMICAL OXYGEN DEMAND 5 DAY (MG/L)	COMPLETE COLIFORM (MPN)	FECAL COLIFORM (EC BROTH) (MPN)
NOV												
30...	1115	39.84	820	7.8	-8.0	.0	--	12.4	87	.6	2400	230
FEB												
22...	1200	40.30	725	7.8	7.0	.5	--	11.2	79	.9	24000	150
MAR												
18...	1430	40.44	714	8.1	.0	6.5	28	12.4	103	.4	11000	<30
MAY												
20...	1145	39.94	722	8.1	30.0	18.5	--	9.2	101	.9	2400	430
JUL												
22...	1030	39.74	695	8.1	21.5	18.5	--	8.4	89	.4	46000	2400
SEP												
23...	1300	38.97	769	8.2	18.0	15.5	8	8.1	83	1.6	2100	230

DATE	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	CARBON DIOXIDE (CO2) (MG/L)
NOV											
30...	--	--	--	--	--	--	380	0	312	--	9.6
FEB											
22...	--	--	--	--	--	--	340	0	279	--	8.6
MAR											
18...	340	140	100	23	7.9	3.1	250	0	205	130	3.2
MAY											
20...	--	--	--	--	--	--	330	0	271	--	4.2
JUL											
22...	--	--	--	--	--	--	350	0	287	--	4.4
SEP											
23...	420	130	120	30	11	3.8	350	0	287	110	3.5

04176365 SALINE RIVER ABOVE SALINE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITRO-GEN (N) (MG/L)	TOTAL ORGANIC NITRO-GEN (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)
NOV												
30...	--	--	--	--	--	.02	.02	--	.01	--	--	--
FEB												
22...	--	--	--	--	--	.39	.01	--	.28	--	--	--
MAR												
16...	22	.2	6.3	468	425	2.1	.04	2.1	.12	.79	.91	3.0
MAY												
20...	--	--	--	--	--	.46	.02	--	.20	--	--	--
JUL												
22...	--	--	--	--	--	.25	.01	--	.46	--	--	--
SEP												
23...	21	.3	14	495	483	.18	.01	.17	.04	.39	.43	.62

DATE	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	TOTAL ORTHO PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
NOV												
30...	--	.01	.01	--	--	--	--	--	--	--	--	.00
FEB												
22...	--	.01	.01	--	--	--	--	--	--	--	--	.00
MAR												
16...	13	.05	.01	.01	--	--	--	110	--	110	--	.00
MAY												
20...	--	.01	.03	--	--	--	--	--	--	--	--	.00
JUL												
22...	--	.01	.01	--	--	--	--	--	--	--	--	.00
SEP												
23...	2.7	.03	.01	.01	1	0	0	10	8	60	<.5	.00

04176400 SALINE RIVER NEAR SALINE, MI

LOCATION.--Lat 42°07'50", long 83°46'35", in SW¼ sec.18, T.4 S., R.5 E., Washtenaw County, Hydrologic Unit 04100002, on right bank 20 ft (6 m) downstream from bridge on Maple Road, and 2.8 mi (4.5 km) south of Saline.

DRAINAGE AREA.--94.6 mi² (245.0 km²).

PERIOD OF RECORD.--October 1965 to September 1977 (discontinued as a continuous-record station; converted to a crest-stage partial-record station).

GAGE.--Water-stage recorder. Altitude of gage is 710 ft (216 m), from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, May 18 to June 20, which are fair. Slight regulation for lake level control. Pumpage for irrigation diverts an indeterminate amount of water. Flow contains city of Saline sewage effluent which originates as ground water. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--12 years, 63.9 ft³/s (1.810 m³/s), 9.17 in/yr (233 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,990 ft³/s (113 m³/s) June 26, 1968, gage height, 13.37 ft (4.075 m); minimum, 5.4 ft³/s (0.15 m³/s) Oct. 9, 12, 1966; minimum gage height, 3.26 ft (0.994 m) July 24, 1966.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 380 ft³/s (10.8 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 5	unknown	400	11.3	unknown		Apr. 24	0400	*483	13.7	*8.83	2.691
Mar. 29	unknown	450	12.7	unknown		Apr. 26	0600	481	13.6	8.82	2.688

Minimum daily discharge, 8.5 ft³/s (0.241 m³/s) Sept. 11, 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	19	19	17	16	66	120	73	15	26	12	10
2	14	19	18	17	16	60	150	65	15	19	11	22
3	14	19	18	16	16	50	190	59	15	17	12	12
4	14	19	18	16	16	230	150	60	15	17	15	10
5	14	18	18	16	16	340	170	60	21	20	18	10
6	45	18	18	16	16	170	130	53	32	16	14	10
7	32	17	18	16	16	110	110	45	26	14	12	10
8	23	17	18	16	16	110	89	41	23	15	13	9.5
9	19	17	18	16	16	134	83	38	45	18	12	9.5
10	18	18	18	16	16	131	74	37	33	13	19	9.0
11	19	18	17	16	17	107	66	34	28	14	18	8.5
12	18	17	17	16	17	116	59	32	25	17	17	8.5
13	17	17	16	16	17	142	54	30	23	15	12	26
14	16	17	16	16	17	109	49	28	21	13	11	13
15	17	17	16	16	17	90	45	26	19	12	10	12
16	16	17	16	16	17	76	42	26	18	14	10	18
17	17	18	17	16	17	62	41	25	22	12	10	17
18	15	18	17	16	16	65	39	40	54	14	9.5	15
19	18	18	17	16	16	60	38	32	45	21	9.5	17
20	21	18	20	16	16	64	39	25	28	15	9.0	21
21	20	18	20	16	16	62	37	22	25	13	12	21
22	20	18	19	16	20	76	45	20	21	13	15	20
23	19	18	17	16	50	75	193	19	19	12	12	20
24	23	18	17	16	180	69	391	18	18	11	21	19
25	20	18	16	16	150	71	252	18	18	14	12	18
26	19	26	16	16	110	81	399	17	18	12	12	56
27	18	35	16	16	80	120	197	16	17	11	11	41
28	18	26	16	16	60	280	139	15	17	11	10	30
29	18	22	17	16	---	380	107	14	21	12	12	24
30	19	20	17	16	---	225	87	14	25	13	11	22
31	22	---	17	16	---	150	---	14	---	12	10	---
TOTAL	598	575	538	498	993	3881	3585	1016	722	456	392.0	539.0
MEAN	19.3	19.2	17.4	16.1	35.5	125	120	32.8	24.1	14.7	12.6	18.0
MAX	45	35	20	17	180	380	399	73	54	26	21	56
MIN	14	17	16	16	16	50	37	14	15	11	9.0	8.5
CFSM	.20	.20	.18	.17	.38	1.32	1.27	.35	.26	.16	.13	.19
IN.	.24	.23	.21	.20	.39	1.53	1.41	.40	.28	.18	.15	.21

CAL YR 1976 TOTAL 26885.0 MEAN 73.5 MAX 1178 MIN 11 CFSM .78 IN 10.57
WTR YR 1977 TOTAL 13793.0 MEAN 37.8 MAX 399 MIN 8.5 CFSM .40 IN 5.42

04176418 SALINE RIVER ABOVE MILAN, MI

LOCATION.--Lat 42°05'02", long 83°41'45", in SE¼ sec.34, T.4 S., R.6 E., Washtenaw County, Hydrologic Unit 04100002, at bridge on Platt Road, at Milan, 0.7 mi (1.1 km) upstream from dam at Milan, 9.9 mi (15.9 km) downstream from gaging station near Saline, and 16.2 mi (26.1 km) upstream from River Raisin.

DRAINAGE AREA.--112 mi² (290 km²), approximately.

PERIOD OF RECORD.--Water years 1971 to current year.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Washtenaw County Health Department.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	STAGE (FT ABOVE DATUM)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	BIOCHEMICAL OXYGEN DEMAND 5 DAY (MG/L)	COMPLETE COLIFORM (MPN)	FECAL COLIFORM (EC BROTH) (MPN)
NOV												
30...	1020	34.87	820	8.0	-8.0	.0	--	12.6	89	.6	1500	430
FEB												
22...	1045	--	900	7.6	4.5	.5	--	7.3	52	1.3	750	<30
MAR												
18...	1230	31.79	786	8.1	.0	4.0	17	10.6	83	2.3	11000	90
MAY												
20...	1045	34.91	725	7.9	28.0	21.5	--	3.5	41	2.4	930	90
JUL												
22...	0945	34.69	816	7.7	20.0	23.5	--	3.3	38	2.3	930	930
SEP												
23...	1130	33.97	922	7.9	18.0	15.5	10	4.0	40	3.8	400	70

DATE	HARDNESS (CA+MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	CARBON DIOXIDE (CO2) (MG/L)
NOV											
30...	--	--	--	--	--	--	310	0	254	--	5.0
FEB											
22...	--	--	--	--	--	--	320	0	262	--	13
MAR											
18...	330	120	95	23	25	3.7	260	0	213	120	3.3
MAY											
20...	--	--	--	--	--	--	320	0	262	--	6.4
JUL											
22...	--	--	--	--	--	--	270	0	221	--	8.6
SEP											
23...	360	110	100	26	64	4.3	310	0	254	130	6.2

04176418 SALINE RIVER ABOVE MILAN, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITRO-GEN (N) (MG/L)
NOV 30...	--	--	--	--	--	.13	.04	--	.02
FEB 22...	--	--	--	--	--	1.7	.03	--	1.4
MAR 18...	49	.2	7.1	508	463	2.6	.07	2.6	.48
MAY 20...	--	--	--	--	--	1.0	.05	--	.23
JUL 22...	--	--	--	--	--	.94	.05	--	.44
SEP 23...	74	.3	12	573	570	1.3	.07	1.4	.08

DATE	TOTAL ORGANIC NITRO-GEN (N) (MG/L)	TOTAL KJEL-DAHL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (N) (MG/L)	TOTAL NITRO-GEN (NO3) (MG/L)	TOTAL PHOS-PHORUS (P) (MG/L)	TOTAL ORTHO PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	DIS-SOLVED CAD-MIUM (CD) (UG/L)
NOV 30...	--	--	--	--	.03	.03	--	--	--
FEB 22...	--	--	--	--	.11	.10	--	--	--
MAR 18...	1.1	1.6	4.3	19	.10	.05	.03	--	--
MAY 20...	--	--	--	--	.04	.04	--	--	--
JUL 22...	--	--	--	--	.13	.12	--	--	--
SEP 23...	.84	.92	2.3	10	.33	.15	.13	1	0

DATE	DIS-SOLVED COBALT (CO) (UG/L)	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	DIS-SOLVED NICKEL (NI) (UG/L)	DIS-SOLVED SELE-NIUM (SE) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
NOV 30...	--	--	--	--	--	--	--	--	.00
FEB 22...	--	--	--	--	--	--	--	--	.00
MAR 18...	--	80	--	130	--	--	--	--	.00
MAY 20...	--	--	--	--	--	--	--	--	.00
JUL 22...	--	--	--	--	--	--	--	--	.00
SEP 23...	0	0	9	80	<.5	35	0	10	.00

04176500 RIVER RAISIN NEAR MONROE, MI

LOCATION.--Lat 41°57'38", long 83°31'52", Monroe County, Hydrologic Unit 04100002, on left bank 0.8 mi (1.3 km) downstream from bridge on Ida Maybee Road, 5.0 mi (8.0 km) downstream from Saline River, and 7.5 mi (12.1 km) west of Monroe.

DRAINAGE AREA.--1,042 mi² (2,699 km²).

PERIOD OF RECORD.--September 1937 to current year. Published as "Raisin River at Monroe" 1937-52 and as "River Raisin at Monroe" 1952-53.

REVISED RECORDS.--WSP 954: 1938-40(m), 1941. WSP 1437: 1939, 1948. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 616.26 ft (187.836 m) above mean sea level. Prior to Oct. 1, 1953, at site 9 mi (14 km) downstream at datum 46.26 ft (14.100 m) lower.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplants above station prior to June 27, 1968. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 693 ft³/s (19.63 m³/s), 9.03 in/yr (229 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,900 ft³/s (365 m³/s) May 19, 1945, Mar. 29, 1950; maximum gage height, 10.7 ft (3.26 m) Feb. 1, 1949, backwater from ice, site and datum then in use; minimum discharge, about 2 ft³/s (0.06 m³/s) Sept. 4, 1938, Sept. 19, 20, 1941, site then in use.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,500 ft³/s (99.1 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 9	0900	*6,230	176	*7.95	2.423	Apr. 26	1100	5,700	161	7.65	2.332
Mar. 29	unknown	4,450	126	6.87	2.094						

Minimum discharge, 45 ft³/s (1.27 m³/s) Aug. 4, gage height, 1.85 ft (0.564 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	179	158	273	160	115	1180	3400	1820	195	171	97	127
2	164	177	210	160	115	944	3600	1390	177	174	98	138
3	176	184	200	160	110	706	3200	1110	174	300	95	139
4	164	184	190	160	110	1350	2500	967	166	309	79	141
5	152	185	185	160	110	2720	2100	921	175	280	95	151
6	167	190	180	160	110	2180	1800	905	233	272	93	145
7	212	170	175	160	110	2600	1500	1010	259	226	102	131
8	250	168	175	160	110	3090	1350	1080	244	208	115	121
9	292	180	170	155	115	3750	1200	983	291	170	132	126
10	246	176	170	150	125	2840	1100	752	290	152	151	118
11	215	178	170	150	135	2020	950	606	276	152	157	111
12	202	183	165	145	155	1760	800	528	279	141	211	109
13	189	165	165	145	170	1790	768	479	268	130	273	131
14	205	162	165	145	190	1600	694	430	266	136	274	138
15	198	167	160	140	195	1420	621	394	248	144	218	191
16	179	166	160	140	200	1250	546	377	216	133	186	225
17	167	162	160	140	200	1050	486	358	207	125	165	199
18	147	165	160	140	200	960	465	342	201	120	144	218
19	144	169	160	140	200	936	445	329	268	115	135	262
20	146	164	160	140	200	976	439	311	275	110	124	355
21	150	157	200	140	210	1080	428	281	265	110	121	551
22	153	164	190	140	220	1240	448	268	242	115	122	495
23	156	169	180	140	240	1300	1800	248	201	110	125	379
24	166	168	170	140	350	1300	4180	243	183	110	151	297
25	164	166	165	135	600	1300	4350	239	174	111	150	245
26	169	172	165	130	944	1300	5480	227	159	117	181	249
27	190	186	160	130	1240	1400	4640	215	152	116	174	252
28	201	209	160	120	1270	1700	3900	203	161	112	159	317
29	176	241	160	120	---	3200	3130	188	161	108	150	373
30	147	339	160	115	---	3900	2430	179	155	104	141	349
31	155	---	160	115	---	3800	---	181	---	99	131	---
TOTAL	5621	5424	5423	4435	8049	56642	58750	17564	6561	4780	4549	6783
MEAN	181	181	175	143	287	1827	1958	567	219	154	147	226
MAX	292	339	273	160	1270	3900	5480	1820	291	309	274	551
MIN	144	157	160	115	110	706	428	179	152	99	79	109
CFSM	.17	.17	.17	.14	.28	1.75	1.88	.54	.21	.15	.14	.22
IN.	.20	.19	.19	.16	.29	2.02	2.10	.63	.23	.17	.16	.24

CAL YR 1976 TOTAL 303470 MEAN 829 MAX 10700 MIN 84 CFSM .80 IN 10.83
WTR YR 1977 TOTAL 184581 MEAN 506 MAX 5480 MIN 79 CFSM .49 IN 6.59

04184500 BEAN CREEK AT POWERS, OH

LOCATION.--Lat 41°40'39", long 84°13'56", in NE¼ sec.24, T.9 S., R.1 E., Fulton County, Hydrologic Unit 04100006, on right bank at downstream side of bridge on U.S. Highway 20, 1 mi (2 km) east of Powers, 2.2 mi (3.5 km) upstream from Iron Creek, 3 mi (5 km) downstream from Silver Creek, and 5.2 mi (8.4 km) east of Fayette.

DRAINAGE AREA.--206 mi² (534 km²).

PERIOD OF RECORD.--October 1940 to current year.

REVISED RECORDS.--WSP 1307: 1948(M). WSP 1912: Drainage area. WDR OH-76-2: 1975.

GAGE.--Water-stage recorder. Datum of gage is 722.57 ft (220.239 m) above mean sea level. Prior to Jan. 18, 1941, nonrecording gage at same site and datum.

REMARKS.--Records good except those for Dec. 1 to Mar. 7 which are fair.

AVERAGE DISCHARGE.--37 years, 161 ft³/s (4.560 m³/s), 10.61 in/yr (269 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,250 ft³/s (120 m³/s) Apr. 29, 1956, gage height, 13.82 ft (4.212 m); minimum, 5.0 ft³/s (0.14 m³/s) Aug. 9, 1964.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft³/s (34.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 6	--	*2,400	68.0	*12.00	3.658	Mar. 29	1415	1,280	36.2	7.51	2.289

Minimum discharge, 9.0 ft³/s (0.25 m³/s) Aug. 4, 5.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	22	24	35	27	25	400	426	208	39	58	11	23
2	22	25	34	27	25	350	439	183	38	48	10	19
3	21	25	34	27	25	400	538	167	37	37	9.9	17
4	21	25	34	26	25	750	400	159	37	51	9.2	17
5	20	25	34	26	25	1500	466	163	38	61	13	17
6	27	25	34	26	25	2200	420	292	40	48	16	16
7	30	24	34	26	25	1500	340	257	41	37	20	14
8	34	24	35	26	25	812	300	181	40	32	23	14
9	30	23	34	25	27	525	260	147	43	33	20	13
10	28	25	37	25	30	428	220	130	47	28	35	12
11	27	28	39	25	34	360	190	121	47	24	53	12
12	26	28	34	25	31	323	180	113	45	27	45	11
13	25	27	37	25	28	347	166	107	45	23	35	15
14	24	26	36	25	26	303	153	102	44	21	26	19
15	24	26	35	25	25	262	143	95	41	27	21	21
16	25	25	36	25	24	224	136	90	38	29	20	23
17	24	26	36	25	24	187	129	86	37	23	19	23
18	23	26	35	25	24	172	124	80	37	22	17	27
19	22	28	34	25	24	169	120	75	34	23	16	53
20	23	26	35	26	24	185	118	72	31	20	15	76
21	23	26	35	27	25	195	117	68	29	18	17	55
22	23	25	34	27	27	243	118	63	27	16	19	43
23	22	25	33	26	32	230	638	60	26	15	17	36
24	25	27	32	25	60	228	978	56	24	15	40	33
25	26	27	30	25	140	215	562	55	31	15	28	30
26	26	26	29	25	320	227	506	51	27	15	20	33
27	25	34	28	25	520	252	379	48	23	15	17	55
28	24	44	27	25	470	655	299	46	23	13	16	72
29	24	39	27	25	---	1180	284	44	22	13	20	59
30	23	36	27	25	---	948	244	41	33	13	19	51
31	24	---	27	25	---	618	---	40	---	12	16	---
TOTAL	763	820	1039	792	2115	16388	9393	3400	1064	832	663.1	909
IN	24.6	27.3	33.5	25.5	75.5	529	313	110	35.5	26.8	21.4	30.3
.	34	44	38	27	520	2200	978	292	47	61	53	76
MIN	20	23	27	25	24	169	117	40	22	12	9.2	11
CFSM	.12	.13	.16	.12	.37	2.57	1.52	.53	.17	.13	.10	.15
IN.	.14	.15	.19	.14	.38	2.96	1.70	.61	.19	.15	.12	.16

CAL YR 1976 TOTAL 67867.0 MEAN 185 MAX 2500 MIN 11 CFSM .90 IN 12.26
WTR YR 1977 TOTAL 38178.1 MEAN 105 MAX 2200 MIN 9.2 CFSM .51 IN 6.89

As the number of streams on which streamflow information is likely to be desired far exceeds the number of stream-gaging stations feasible to operate at one time, the Geological Survey collects limited stream-flow data at sites other than stream-gaging stations. When limited streamflow data are collected on a systematic basis over a period of years for use in hydrologic analyses, the site at which the data are collected is called a partial-record station. Data collected at these partial-record stations are useable in low-flow or floodway analyses, depending on the type of data collected. In addition, discharge measurements are made at other sites not included in the partial-record program. These measurements are generally made in time of drought or flood to give better areal coverage to those events. Those measurements and others collected for some special reason are called measurements at miscellaneous sites.

Records collected at partial-record stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations and the second is a table of annual maximum stage and discharge at crest-stage stations. Discharge measurements made at miscellaneous sites for both low flow and high flow are given in a third table.

Low-flow partial-record stations

Measurements of streamflow in the area covered by this report made at low-flow partial-record stations are given in the following table. These measurements were made during periods of base flow when streamflow is primarily from ground-water storage. These measurements, when correlated with the simultaneous discharge of a nearby stream where continuous records are available, will give a picture of the low-flow potentiality of a stream. The column headed "Period of record" shows the water years in which measurements were made at the same, or practically the same, site.

Discharge measurements made at low-flow partial-record stations during water year 1977

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Superior				
04044583	Cherry Creek near Harvey, MI	Lat 46°28'07", long 87°21'53", in NE¼ SE¼ sec.13, T.47 N., R.25 W., Marquette County, 0.5 mile upstream from County Highway 551, 2.0 miles south of Harvey.	4.53	1966-70‡ 1971-77	05-18-77 09-20-77	19.7 19.2
		Streams tributary to Lake Michigan				
04057580	Whitefish River near Rapid River, MI	Lat 45°57'56", long 86°55'15", in SE¼ NW¼ sec.10, T.41 N., R.21 W., Delta County, about 800 ft downstream from Chippeny Creek, 3.5 miles northeast of Rapid River.	284	1973-77	12-27-76 05-13-77 07-20-77 08-18-77	60.0 282 127 99.3
04058120	Green Creek near Palmer, MI	Lat 46°22'22", long 87°36'21", in NW¼ sec. 19, T.46 N., R.26 W., Marquette County, at bridge on County Highway 565, 4.5 miles south of Palmer.	a8.42	1961-65 1970-77	10-20-76 11-24-76 12-17-76 01-19-77 02-16-77 03-15-77 04-19-77 05-17-77 06-20-77 07-21-77 08-24-77	b6.45 b12.1 b19.2 b18.0 b14.0 b32.9 b20.8 b8.38 b3.29 b3.40 b2.42
04058250	Warner Creek tributary near Palmer, MI	Lat 46°25'20", long 87°36'09", in NW¼ SE¼ sec.31, T.47 N., R.26 W., Marquette County, at double culvert on County Road 565, 0.3 mile upstream from mouth and 0.8 mile south of Palmer	4.05	1972-77	10-20-76 11-24-76 12-16-76 01-19-77 02-16-77 03-15-77 04-19-77 05-17-77 06-20-77 07-19-77 08-24-77	b.93 b2.00 b.28 b.27 b.21 b12.9 b8.13 b2.65 b1.67 b2.90 b1.49
04059042	Portage Creek at Escanaba, MI	Lat 45°43'15", long 87°05'53", in SW¼ NW¼ sec.1, T.38 N., R.23 W., Delta County, at culvert on east-west runway of Delta County Airport, 600 ft downstream from Willow Creek, at Escanaba.	20.3	1973-77	05-18-77	9.21
04059750	Big Cedar River near Cedar River, MI	Lat 45°31'26", long 87°23'42", in NW¼ NE¼ sec.16, T.36 N., R.25 W., Menominee County, at bridge on county highway, 1.3 miles upstream from Devils Creek and 8 miles north of Cedar River.	270	1973-77	10-13-76 05-12-77 06-23-77 08-05-77	4.74 125 33.0 67.7
04059757	Big Brook near Ingalls, MI	Lat 45°23'25", long 87°30'54", in NE¼ NE¼ sec.33, T.34 N., R.26 W., Menominee County, at bridge on county road, 1,500 ft downstream from Baird Creek, 4.7 miles east of Ingalls.	20.8	1973-77	10-13-76 05-12-77 06-23-77 08-05-77	0 9.58 .79 1.67
04065397	East Branch Sturgeon River at Hardwood, MI	Lat 45°58'35", long 87°41'21", in NW¼ SE¼ sec.4, T.41 N., R.27 W., Dickinson County 1.0 mile north of Hardwood.	89.8	1972-77	03-03-77 08-08-77 09-21-77	13.9 17.1 b109

See footnotes at end of table

Discharge measurements made at low-flow partial-record stations during water year 1977--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Michigan--Continued				
04065570	Pine Creek near Merriman, MI	Lat 45°56'42", long 87°59'13", in SW¼ SW¼ sec.18, T.41 N., R.29 W., Dickinson County, 500 ft upstream from Mounty's Creek, 3.7 miles northeast of Merriman.	8.79	1971-77	05-13-77 09-20-77	b0.15 bc.10
04065580	Mounty's Creek near Merriman, MI	Lat 45°56'41", long 87°59'23", in SW¼ SW¼ sec.18, T.41 N., R.29 W., Dickinson County, 400 ft upstream from mouth, and 3.6 miles northeast of Merriman.	2.96	1971-77	05-13-77 09-20-77	b.79 b11.5
04065590	Steel Creek near Merriman, MI	Lat 45°56'31", long 87°59'33", in NE¼ NE¼ sec.24, T.41 N., R.30 W., Dickinson County, 200 ft upstream from mouth, 3.6 miles northeast of Merriman.	3.52	1971-77	05-13-77 09-20-77	1.41 b7.47
04066615	Little Shakey Creek near Daggett, MI	Lat 45°27'18", long 87°45'10", in NE¼ SW¼ sec.3, T.35 N., R.28 W., (Michigan meridian) Menominee County, at bridge 200 ft downstream from Lake Ann, 7.0 miles west of Daggett.	13.8	1973-77	10-13-76 05-12-77 06-23-77 08-04-77	1.68 8.13 3.14 3.73
04096517	Hog Creek tributary near Allen, MI	Lat 41°57'33", long 84°49'33", in SW¼ SW¼ sec.7, T.6 S., R.4 W., Hillsdale County, at Squires Road, 0.3 mile upstream from mouth, 3.0 miles west of Allen.	2.61	1969-77	11-26-76 05-27-77 08-03-77 09-08-77	1.44 1.24 1.53 1.16
04115450	Fish Creek at Carson City, MI	Lat 43°10'40", long 84°51'24", in SW¼ sec.12, T.9 N., R.5 W., Montcalm County, on downstream side of footbridge in park, 300 ft upstream of bridge on State Highway 57, at Carson City.	126	1974-77	10-20-76 04-14-77 05-23-77 06-22-77 07-27-77	56.1 87.3 39.6 28.5 14.5
04119061	Plaster Creek at Wyoming, MI	Lat 42°56'15", long 85°41'24", in NE¼ sec.2, T.6 N., R.12 W., Kent County, at Godfrey St., at Wyoming.	57.1	1974-77	10-20-76 04-13-77 05-18-77 06-21-77	17.0 29.0 20.3 19.2
*04120295	Black Creek near Muskegon, MI	Lat 43°12'14", long 86°09'52", in NE¼ NW¼ sec.1, T.9 N., R.16 W., Muskegon County, at bridge on Mill Iron Road, 4.8 miles east of Muskegon, and 4.9 miles upstream from mouth.	d39	1974-77	10-20-76 04-27-77 06-01-77 07-06-77 08-10-77 09-13-77	b31.8 b59.8 b47.6 b46.8 b38.5 b29.8
04121920	Tamarack Creek at Howard City, MI	Lat 43°24'03", long 84°28'06", in NW¼ SE¼ sec.26, T.12 N., R.10 W., Montcalm County, at upstream side of bridge on highway U.S. 131, in Howard City.	85.4	1973-77	11-22-76 07-07-77 8-09-77	33.7 b25.3 b22.4
*04122223	Pentwater River near Hart, MI	Lat 43°43'27", long 86°22'36", in NW¼ SW¼ sec.5, T.15 N., R.17 W., Oceana County at culverts on county road, 0.85 miles downstream from hydroelectric plant on Hart Lake, 1.8 miles northwest of Hart.		1974-77	10-20-76 07-06-77	13.4 b96.0
*04122230	North Branch Pentwater River near Pentwater, MI	Lat 43°47'42", long 86°21'30", in NE¼ SE¼ sec.8, T.16 N., R.17 W., Oceana County, at bridge on highway U.S. 31, 3.5 miles northwest of Pentwater, and 5.1 miles upstream from mouth.		1974-77	10-19-76 03-15-77 07-05-77 08-11-77	43.6 b207 b43.8 b40.8
04122300	Pere Marquette River near Baldwin, MI	Lat 43°51'27", long 85°51'01", in SW¼ SE¼ sec.15, T.17 N., R.13 W., Lake County, 300 ft upstream from bridge on M-37, 2.7 miles south of Baldwin.	167	1973-77	06-28-77 08-04-77	110 98.8
*04126600	Betsie River near Benzonia, MI	Lat 44°36'02", long 86°05'57", in NW¼ NW¼ sec.2, T.25 N., R.15 W., Benzie County, at bridge on highway US-31, 1.2 miles south of Benzonia, and 1.4 miles downstream from Homestead Dam.	d170	1974-77	10-18-76 03-17-77 06-29-77 8-03-77	155 b586 126 b151
04126610	Crystal Lake Outlet near Benzonia, MI	Lat 44°37'56", long 86°08'41", in NW¼ NE¼ sec.29, T.26 N., R.15 W., Benzie County, at culvert on State Highway 115, 0.3 mile downstream from dam at outlet of Crystal Lake, and 2.5 miles west of Benzonia.	d32	1974-77	10-18-76 08-03-77	.48 b7.99
04127700	Elk River at Elk Rapids, MI	Lat 44°54'02", long 85°24'42", in SW¼ NW¼ sec.21, T.29 N., R.9 W., Antrim County, on upstream side of highway bridge at nonoperative hydroelectric plant in Elk Rapids, 500 ft upstream from mouth.	513	1973-77	05-26-77 07-07-77 8-02-77	597 b349 b620

See footnotes at end of table

Discharge measurements made at low-flow partial-record stations during water year 1977--Continued

Station No.	Station Name	Location	Drainage area (mi^2)	Period of record	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Michigan--Continued				
*04127850	Boyne River near Boyne City, MI	Lat 45°11'48", long 84°57'26", in NW¼ SW¼ sec.5, T32 N., R.5 W., Charlevoix County, at culvert on Dam Road, 0.3 mile downstream from nonoperative hydroelectric plant, 2.8 miles southeast of Boyne City, and 3.6 miles upstream from mouth.	d65	1974-77	03-01-77 04-11-77 05-10-77 06-06-77	e83.5 eb156 eb84.0 eb108
		Streams tributary to Lake Huron				
04137800	Tawas River at Tawas City, MI	Lat 44°16'39", long 83°30'53", in NE¼ NW¼ sec.30, T.22 N., R.8 E., Iosco County, on downstream side of bridge on State Highway 55, in Tawas City.	156	1973-77	06-23-77 07-14-77	31.5 35.6
04143200	Pine River near Standish, MI	Lat 43°59'06", long 83°53'15", in SE¼ SE¼ sec.5, T.18 N., R.5 E., Arenac County, 100 ft downstream from confluence of North and South Branches, 3.5 miles east of Standish.	91.9	1973-77	10-04-76 06-22-77 07-27-77	3.71 1.58 1.11
04145930	South Branch Flint River near Lapeer, MI	Lat 43°02'35", long 83°17'04", in NW¼ sec.10, T.7 N., R.10 E., Lapeer County, at Morris Rd., 0.2 mile south of State Highway 21 and 1.5 miles southeast of Lapeer.	77.9	1973-77	10-14-76 11-09-76 06-02-77 08-02-77	27.2 28.6 19.1 11.7
*04146020	South Branch Flint River near Millville, MI	Lat 43°04'44", long 83°18'25", in SE¼ sec.29, T.8 N., R.10 E., Lapeer County, at bridge on Saginaw Road, 1.6 miles north of Lapeer.	160	1974-77	10-14-76 11-10-76 06-02-77 08-02-77	48.9 68.9 30.8 18.4
		Streams tributary to St. Clair River				
04159300	Black River near Croswell, MI	Lat 43°13'24", long 82°36'49", in SE¼ sec.8, T.9 N., R.16 E., Sanilac County, 3.5 miles south of Croswell.	376	1956-77	11-09-76	17.3
*04160350	Pine River near Rattle Run, MI	Lat 42°52'49", long 82°34'04", in NE¼ sec.9, T.5 N., R.16 E., St. Clair County, at bridge on Gratiot Road, 1.9 miles northeast of Rattle Run.	135	1974-77	10-15-76 11-10-76 06-07-77 08-16-77	2.00 4.00 3.28 1.17
		Streams tributary to Lake St. Clair				
04161585	Stony Creek near Goodison, MI	Lat 42°45'49", long 83°04'28", in SW¼ sec.17, T.4 N., R.12 E., at Inwood Road, Macomb County, 5.2 miles northeast of Goodison.	34.6	1972-77	10-13-76 11-10-76 05-03-77 08-18-77	16.8 18.4 19.9 7.34

* Also a crest-stage station.
‡ Operated as a continuous-record gaging station.
a Since 1970, affected by diversion for industrial use.
b Not base flow.
c Field estimate.
d Approximately
e Discharge measurement made by employees of Michigan Department of Natural Resources.

Crest-stage partial-record stations

The following table contains annual maximum discharge for crest-stage stations. A crest-stage gage is a device which will register the peak stage occurring between inspections of the gage. A stage-discharge relation for each gage is developed from discharge measurements made by indirect measurements of peak flow or by current meter. The date of the maximum discharge is not always certain, but is usually determined by comparison with nearby continuous-record stations, weather records, or local inquiry. Only the maximum discharge for each water year is given. Information on some lower floods may have been obtained but is not published herein. The years given in the period of record represent water years for which the annual maximum has been determined.

Annual maximum discharge at crest-stage partial-record stations during water year 1977

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (ft^3/s)
		Streams tributary to Lake Superior					
04032000	Presque Isle River near Tula, MI	Lat 46°32'49", long 89°46'38", in NW¼ sec.23, T.48 N., R.44 W., Gogebic County, at bridge on State Highway 28, 7 miles southwest of Merriweather, 5.5 miles downstream from Little Presque Isle River, and 2.0 miles east of Tula.	261	1945-73‡, 1974-77	04-13-77	a	b1,200
04039500	South Branch Ontonagon River at Ewen, MI	Lat 46°31'58", long 89°16'37", in NW¼ sec.26, T.48 N., R.40 W., Ontonagon County, on piers of old State Highway 28 bridge, at Ewen.	348	1939-41, 1942-71‡, 1972-77	03-29-77	10.95	2,390
04041000	Perch River near Sidnaw, MI	Lat 46°31'06", long 88°39'48", in NE¼ sec.34, T.48 N., R.35 W., Baraga County, at State Highway 28, 2.5 miles east of Sidnaw.	63.1	1913-15‡, 1957-77	04-16-77	--	b550
04042500	Otter River near Elo, MI	Lat 46°50'09", long 88°38'12", in NE¼ NE¼ sec.8, T.51 N., R.34 W., Houghton County, 50 feet upstream from highway bridge, 1.6 miles north of Pelkie, 2.5 miles south of Elo, and 5.5 miles upstream from Otter Lake.	162	1943-72‡, 1973-77	04-16-77	7.37	2,170
04044200	Carp Creek at Ishpeming, MI	Lat 46°29'11", long 87°41'21", in NW¼ sec.9, T.47 N., R.27 W., Marquette County, at bridge on Highway 41A, at Ishpeming.	16.5	1970-77	04-13-77	6.07	100
04044813	Two Hearted River near Paradise, MI	Lat 46°41'57", long 85°25'19", in NW¼ SW¼ sec.27, T.50 N., R.9 W., Luce County, at foot bridge in State Forest Campground, 0.4 mile upstream from mouth, and 18 miles northwest of Paradise.	201	1973-77	04-20-77	3.70	2,000
04045538	West Branch Waiska River near Brimley, MI	Lat 46°21'18", long 84°35'35", in SW¼ NW¼ sec.29, T.46 N., R.2 W., Chippewa County, at bridge on county road, 3.2 miles upstream from mouth, and 3.5 miles south of Brimley.	40.7	1973-77	04-14-77	7.21	563
04045559	East Branch Waiska River near Brimley, MI	Lat 46°25'07", long 84°28'24", in NW¼ NE¼ sec.6, T.46 N., R.1 W., Chippewa County, at bridge on county road, 4.0 miles upstream from mouth, and 4.7 miles east of Brimley.	31.9	1973-77	04-14-77	c13.29	889
		Streams tributary to Lake Michigan					
04049500	Manistique River at Germfask, MI	Lat 46°14'00", long 85°55'40", in SE¼ sec.4, T.44 N., R.13 W., Schoolcraft County, 600 feet upstream from bridge on State Highway 77, 1.0 mile south of Germfask.	341	1938-70‡, 1971-77	04-16-77	6.21	1,500
04055000	Manistique River near Blaney, MI	Lat 46°05'05", long 86°03'35", in SE¼ sec.28, T.43 N., R.14 W., Schoolcraft County, 40 feet downstream from logging bridge, 0.5 mile downstream from Duck Creek, and 7 miles southwest of Blaney.	704	1938-70‡, 1971-77	04-16-77	16.96	3,560
04057000	Indian River near Manistique, MI	Lat 45°59'30", long 86°17'15", in NE¼ sec.34, T.42 N., R.16 W., Schoolcraft County, near outlet of Indian Lake, 2.4 miles northwest of Manistique.	302	1938-71‡, 1972-77	04-22-77	5.63	930
04057900	Black River near Republic, MI	Lat 46°25'08", long 87°53'21", in NE¼ sec.2, T.46 N., R.29 W., Marquette County, at bridge on county road, 4.4 miles east of Republic.	34.4	1961-68‡, 1970-77	04-13-77	d3.28	203
04062300	Michigamme River at Republic, MI	Lat 46°23'03", long 87°58'48", in SE¼ sec.18, T.46 N., R.29 W., Marquette County, on left bank 400 feet upstream from county highway bridge, 0.3 mile upstream from Trout Falls Creek, and 0.6 mile south of Republic.	240	1961-75‡, 1976-77	04-22-77	5.85	2,320

See footnotes at end of the table

Annual maximum discharge at crest-stage partial-record stations during water year 1977--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Annual maximum Date	Gage height (feet)	Discharge (ft^3/s)
		Streams tributary to Lake Michigan--Continued					
04096020	Galien River near Union Pier, MI	Lat 41°49'39", long 86°39'21", in NE¼ sec.32, T.7 S., R.20 W., Berrien County, on downstream side of bridge on Union Pier Road, 1.5 miles east of Union Pier.	86.1	1973-77	--	e9.43	f
04097060	Little Portage Creek near Fulton, MI	Lat 42°05'19", long 85°23'29", in SW¼ sec.29, T.4 S., R.9 W., Kalamazoo County, at bridge on 38th Street, 2.8 miles southwest of Fulton.	27.0	1965-67‡, 1972-77	03-30-77	4.10	98
04097370	Flowerfield Creek at Flowerfield, MI	Lat 42°03'50", long 85°39'44", in SW¼ sec.1, T.5 S., R.12 W., St. Joseph County, at Flowerfield Road, at Flowerfield.	42.6	1964-77	02-24-77	1.45	62
04098500	Fawn River near White Pigeon, MI	Lat 41°46'56", long 85°35'00", in SW¼ sec.10, T.8 S., R.11 W., St. Joseph County, on right bank 0.3 mile downstream from bridge on county highway, 3.1 miles east of White Pigeon, and 3.5 miles upstream from Sherman Mill Creek.	192	1958-75‡, 1976-77	04-02-77	3.71	360
04112700	Sycamore Creek near Mason, MI	Lat 42°36'38", long 84°27'58", in NE¼ NE¼ sec.31, T.3 N., R.1 W., Ingham County, at bridge on Harper Road, 0.7 mile downstream from Aurelius and VeVoy Drain, and 2.6 miles northwest of Mason.	39.5	1975-77	03-29-77	g8.80	183
04113090	Carrier Creek near Grand Ledge, MI	Lat 42°43'36", long 84°39'16", in SE¼ SW¼ sec.15, T.4 N., R.3 W., Eaton County, at bridge on St. Joe Highway, 3.7 miles upstream from mouth, and 4.0 miles southeast of Grand Ledge.	7.18	1975-77	03-04-77	4.38	66
04117000	Quaker Brook near Nashville, MI	Lat 42°33'57", long 85°05'37", in NW¼ sec.13, T.2 N., R.7 W., Barry County, on left bank 150 feet upstream from culvert on county road, 500 feet upstream from small tributary, and 2.5 miles south of Nashville.	7.60	1955-75‡, 1976-77	03-04-77	2.99	61
04119055	Plaster Creek at Grand Rapids, MI	Lat 42°54'46", long 85°39'02", in SE¼ sec.7, T.6 N., R.11 W., Kent County, on right downstream side of bridge on 28th Street, at Grand Rapids.	46.6	1974-77	09-24-77	6.15	218
04119160	Buck Creek at Grandville, MI	Lat 42°54'09", long 85°45'46", in SE¼ sec.18, T.6 N., R.12 W., Kent County, on right downstream side of bridge on Wilson Avenue, at Grandville.	50.5	1974-77	03-05-77	6.35	270
*04120295	Black Creek near Muskegon, MI	Lat 43°12'14", long 86°09'52", in NW¼ NW¼ sec.1, T.9 N., R.16 W., Muskegon County, at bridge on Mill Iron Road, 4.8 miles east of Muskegon.	h39	1974-77	03-12-77	4.37	235
04121000	Muskegon River near Merritt, MI	Lat 44°20'08", long 84°53'24", in NW¼ NW¼ sec.2, T.22 N., R.5 W., Missaukee County, on right bank 35 feet upstream from bridge on State Highway 55, 2.7 miles east of Merritt.	355	1946-73‡, 1974-77	03-14-77	7.59	790
*04122223	Pentwater River near Hart, MI	Lat 43°43'27", long 86°22'36", in NW¼ SW¼ sec.5, T.15 N., R.17 W., Oceana County, at culverts on county road, 0.8 mile downstream from hydroelectric plant on Hart Lake, 1.8 miles northwest of Hart.	h78	1975-77	03-15-77	4.47	283
*04122230	North Branch Pentwater River near Pentwater, MI	Lat 43°47'42", long 86°21'30", in NE¼ SE¼ sec.8, T.16 N., R.17 W., Oceana County, at bridge on U.S. Highway 31, 3.5 miles northwest of Pentwater.	h44	1975-77	03-15-77	3.38	290
04123500	Manistee River near Grayling, MI	Lat 44°41'35", long 84°50'50", in SW¼ NW¼ sec.31, T.27 N., R.4 W., Crawford County, on right bank 25 feet upstream from bridge on State Highway 72, 6.8 miles northwest of Grayling.	159	1942-73‡, 1974-77	03-30-77	1.23	278
04124500	East Branch Pine River near Tustin, MI	Lat 44°06'09", long 85°31'02", in NE¼ NW¼ sec.28, T.20 N., R.10 W., Osceola County, 75 feet downstream from highway bridge, 3.0 miles west of Tustin.	h63	1953-63‡, 1964-77	--	i	f

See footnotes at end of the table

Annual maximum discharge at crest-stage partial-record stations during water year 1977--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Annual maximum Date	Annual maximum Gage height (feet)	Annual maximum Discharge (ft^3/s)
		Streams tributary to Lake Michigan--Continued					
04126200	Little Manistee River near Freesoil, MI	Lat 44°11'00", long 86°10'00", in NE¼ NE¼ sec.31, T.21 N., R.15 W., Manistee County, on right bank 25 feet upstream from Six Mile Bridge, 5.8 miles north of Freesoil, 7.4 miles upstream from mouth, and 9.0 miles southeast of Manistee.	200	1956-75‡, 1976-77	03-15-77	3.27	449
*04126600	Betsie River near Benzonia, MI	Lat 44°36'02", long 86°05'57", in NW¼ NW¼ sec.2, T.25 N., R.15 W., Benzie County, at bridge on U.S. Highway 31, 1.2 miles south of Benzonia.	h170	1975-77	03-13-77	4.40	920
*04127850	Boyne River near Boyne City, MI	Lat 45°11'48", long 84°57'26", in NW¼ SW¼ sec.5, T.32 N., R.5 W., Charlevoix County, at culvert on Dam Road, 0.3 mile downstream from nonoperative hydroelectric plant, 2.8 miles southeast of Boyne City.	h65	1975-77	--	i	f
		Streams tributary to Lake Huron					
04132000	Black River near Cheboygan, MI	Lat 45°29'59", long 84°19'36", in NW¼ NW¼ sec.21, T.36 N., R.1 E., Cheboygan County, on left bank 0.3 mile downstream from Black Lake, 5.3 miles upstream from Alvarns Dam, and 12.6 miles southeast of Cheboygan.	597	1942-74‡, 1975-77	--	i	f
04132500	Thunder Bay River near Hillman, MI	Lat 45°00'30", long 83°58'21", in NE¼ SE¼ sec.8, T.30 N., R.4 E., Montmorency County, on left bank 25 feet upstream from bridge on State Highway 32, 5.2 miles southwest of Hillman.	232	1946-72‡, 1973-77	03-15-77	7.81	693
04138000	East Branch Au Gres River at McIvor, MI	Lat 44°13'57", long 83°42'03", in NW¼ NW¼ sec.10, T.21 N., R.6 E., Iosco County, on right bank 25 feet downstream from bridge on Whittemore Road at McIvor, and 11.5 miles upstream from mouth.	h84	1950-73‡, 1974-77	03-11-77	j8.02	140
04138600	Gamble Creek at Lupton, MI	Lat 44°25'26", long 84°01'32", in SW¼ SW¼ sec.36, T.24 N., R.3 E., Ogemaw County, at culvert on Lupton Road, 0.5 mile south of Lupton.	9.47	1953-56, 1959-77	03-13-77	3.00	30
04138700	Bixby Creek near Rose City, MI	Lat 44°26'06", long 84°07'16", in NE¼ NW¼ sec.31, T.24 N., R.3 E., Ogemaw County, at bridge on State Highway 33, 0.9 mile north of Rose City.	2.68	1953-77	03-13-77	2.74	51
04138800	Houghton Creek at Rose City, MI	Lat 44°25'17", long 84°06'34", in NE¼ NE¼ sec.6, T.23 N., R.3 E., Ogemaw County, at bridge on Rose City Road, 0.3 mile east of Rose City.	13.3	1953-77	03-13-77	1.64	135
04138900	Wilkins Creek near Rose City, MI	Lat 44°24'18", long 84°06'59", in NE¼ NW¼ sec.7, T.23 N., R.3 E., Ogemaw County, at bridge on State Highway 33, 1.1 miles south of Rose City.	9.15	1953-77	03-13-77	2.54	86
04139000	Houghton Creek near Lupton, MI	Lat 44°23'45", long 84°02'50", in SE¼ SE¼ sec.10, T.23 N., R.3 E., Ogemaw County, 2.7 miles southwest of Lupton.	29.7	1950-72‡, 1973-77	03-13-77	4.96	256
04139500	Rifle River at "The Ranch" near Lupton, MI	Lat 44°23'36", long 84°02'18", in SE¼ SW¼ sec.11, T.23 N., R.3 E., Ogemaw County, at downstream side of bridge, 2.7 miles south of Lupton.	56.8	1951-71‡, 1972-77	03-13-77	8.84	359
04140000	Prior Creek near Selkirk, MI	Lat 44°20'06", long 84°04'06", in SE¼ SE¼ sec.33, T.23 N., R.3 E., Ogemaw County, on right bank 20 feet upstream from culverts on Peters Road, 1.5 miles north of Selkirk.	21.4	1950-72‡, 1973-77	03-13-77	4.94	170
04140200	Klacking Creek near Selkirk, MI	Lat 44°20'05", long 84°08'46", in NE¼ NE¼ sec.2, T.22 N., R.2 E., Ogemaw County, at bridge on Campbell Road, 4.0 miles northwest of Selkirk.	7.51	1953-77	03-13-77	0.97	36

See footnotes at end of the table

Annual maximum discharge at crest-stage partial-record stations during water year 1977--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Annual maximum Date	Annual maximum Gage height (feet)	Annual maximum Discharge (ft^3/s)
		Streams tributary to Lake Huron--Continued					
04141100	Shepards Creek near Selkirk, MI	Lat 44°18'27", long 84°05'05", in SE¼ SE¼ sec.8, T.22 N., R.3 E., Ogemaw County, at bridge on Bedtelyon Road, 1.1 miles southwest of Selkirk.	4.44	1953-77	03-13-77	3.53	86
04144180	Jones Creek near Gaines, MI	Lat 42°53'02", long 83°52'27", in SE¼ sec.28, T.6 N., R.5 E., Genesee County, at bridge on Baldwin Road, 1.7 miles northeast of Gaines.	7.60	1970-77	04-05-77	k4.83	45
04144200	Porter Drain near Gaines, MI	Lat 42°53'26", long 83°50'59", in SE¼ sec.27, T.6 N., R.5 E., Genesee County, at bridge on Seymour Road, 3.2 miles east of Gaines.	4.68	1970-77	03-29-77	2.22	17
04144220	Jones Creek at Duffield, MI	Lat 42°54'45", long 83°54'27", in SE¼ sec.17, T.6 N., R.5 E., Genesee County, at bridge on Grand Blanc Road, 1.0 mile south of Duffield.	23.4	1970-77	03-29-77	m5.32	120
*04146020	South Branch Flint River near Millville, MI	Lat 43°04'44", long 83°18'25", in SE¼ sec.29, T.8 N., R.10 E., Lapeer County, on downstream right wingwall of bridge on Saginaw Road, 1.6 miles north of Lapeer.	160	1974-77	--	<6.90	<480
04147800	Powers-Cullen Drain near Genesee, MI	Lat 43°05'33", long 83°33'31", in SW¼ sec.18, T.8 N., R.8 E., Genesee County, at bridge on Coldwater Road, 3.3 miles southeast of Genesee.	9.17	1970-77	--	<2.46	<90
04147900	Lefler-Scotham Drain near Otisville, MI	Lat 43°08'11", long 83°32'27", in NE¼ sec.5, T.8 N., R.8 E., Genesee County, at bridge on Frances Road, 2.2 miles south of Otisville.	4.90	1970-77	--	<3.12	<25
04148120	Kearsley Creek near Atlas, MI	Lat 42°57'15", long 83°32'42", in NE¼ sec.5, T.6 N., R.8 E., Genesee County, at bridge on Jordan Road, 1.2 miles north of Atlas.	55.7	1970-77	04-05-77	6.53	149
04148139	Black Creek near Davision, MI	Lat 43°01'28", long 83°33'24", in SE¼ sec.7, T.7 N., R.8 E., Genesee County, at bridge on Irish Road, 2.0 miles west of Davision.	22.8	1970-77	04-05-77	4.56	100
04148144	Chipmunk Creek near Genesee, MI	Lat 43°04'01", long 83°36'59", in SE¼ sec.27, T.8 N., R.7 E., Genesee County, at bridge on Genesee Road, 3.1 miles south of Genesee.	5.50	1970-77	--	<3.05	<60
04148200	Swartz Creek near Holly, MI	Lat 42°49'39", long 83°37'42", in SW¼ sec.15, T.5 N., R.7 E., Oakland County, on right bank 25 feet downstream from bridge on Elliot Road, 2.4 miles north of Holly.	12.0	1956-75‡, 1976-77	04-04-77	2.60	30
04148255	Swartz Creek near Grand Blanc, MI	Lat 42°53'09", long 83°41'29", in SE¼ sec.25, T.6 N., R.6 E., Genesee County, at bridge on Baldwin Road, 4.1 miles southwest of Grand Blanc.	36.0	1970-77	04-04-77	4.08	65
04148260	Swartz Creek near Swartz Creek, MI	Lat 42°58'22", long 83°45'43", in SW¼ sec.28, T.7 N., R.6 E., Genesee County, at bridge on Bristol Road, 3.9 miles east of Swartz Creek.	67.2	1970-77	--	e5.36	<200
04148265	Kimball Drain near Swartz Creek, MI	Lat 42°55'15", long 83°49'51", in NE¼ sec.14, T.6 N., R.5 E., Genesee County, at bridge on Morrish Road, 2.4 miles south of Swartz Creek.	10.6	1970-77	03-29-77	4.13	82
04148270	West Branch Swartz Creek near Swartz Creek, MI	Lat 42°58'22", long 83°46'08", in SW¼ sec.28, T.7 N., R.6 E., Genesee County, at bridge on Bristol Road, 3.2 miles east of Swartz Creek.	40.8	1970-77	--	<5.40	<181
04148410	Thread Creek near Goodrich, MI	Lat 42°53'19", long 83°32'10", in SE¼ sec.29, T.6 N., R.8 E., Genesee County, at bridge on Baldwin Road, 2.4 miles southwest of Goodrich.	28.5	1970-77	--	<3.24	<100
04148610	Cole Creek near Flushing, MI	Lat 43°02'44", long 83°51'06", in SW¼ sec.35, T.8 N., R.5 E., Genesee County, at bridge on Potter Road, 1.2 miles south of Flushing.	8.51	1970-77	04-05-77	4.70	67

See footnotes at end of the table

Annual maximum discharge at crest-stage partial-record stations during water year 1977--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Annual maximum Date	Gage height (feet)	Discharge (ft^3/s)
		Streams tributary to Lake Huron--Continued					
04148620	Freeman Drain near Montrose, MI	Lat 43°07'04", long 83°53'37", in SE¼ sec.5, T.8 N., R.5 E., Genesee County, at bridge on Mt. Morris Road, 4.0 miles south of Montrose.	8.21	1970-77	03-04-77	3.24	47
04148640	Armstrong Creek near Montrose, MI	Lat 43°08'04", long 83°50'03", in SE¼ sec.35, T.9 N., R.5 E., Genesee County, at bridge on Morrish Road, 4.1 miles southeast of Montrose.	11.0	1970-77	04-05-77	5.29	132
04148740	Central-Stadler Drain near Montrose, MI	Lat 43°09'46", long 83°50'14", in SE¼ sec.23, T.9 N., R.5 E., Genesee County, at bridge on Wilson Road, 3.1 miles east of Montrose.	14.2	1970-77	06-29-77	3.40	68
04148800	Pine Run near Montrose, MI	Lat 43°12'42", long 83°48'54", in SE¼ sec.1, T.9 N., R.5 E., Genesee County, at bridge on Elms Road, 4.7 miles northeast of Montrose.	27.8	1970-77	04-05-77	5.89	185
04148900	Silver Creek near Clio, MI	Lat 43°12'54", long 83°45'55", in NW¼ sec.4, T.9 N., R.6 E., Genesee County, at bridge on Weir Road, 3.0 miles northwest of Clio.	4.01	1970-77	04-05-77	2.42	32
04149300	Misteguay Creek near Flushing, MI	Lat 43°01'31", long 83°54'41", in NE¼ sec.7, T.7 N., R.5 E., Genesee County, at bridge on Duffield Road, 3.7 miles southwest of Flushing.	17.4	1970-77	04-05-77	5.28	147
04151000	Cass River at Vassar, MI	Lat 43°22'15", long 83°34'52", in NW¼ SW¼ sec.7, T.11 N., R.8 E., Tuscola County, at bridge on State Highway 15, at Vassar.	710	1949-70‡, 1971-77	03-11-77	8.23	2,750
04153500	Salt River near North Bradley, MI	Lat 43°42'10", long 84°28'14", in NE¼ SE¼ sec.7, T.15 N., R.1 W., Midland County, at bridge on North Saginaw Road, 1.1 miles southeast of North Bradley.	138	1935-71‡, 1972-77	03-06-77	j10.08	500
04154500	Chippewa River near Midland, MI	Lat 43°35'40", long 84°22'10", in NE¼ NE¼ sec.24, T.14 N., R.1 W., Midland County, on upstream side of bridge on Meridian Road, 6.5 miles southwest of Midland.	597	1947-72‡, 1973-77	03-14-77	5.35	3,320
		Streams tributary to St. Clair River					
04159900	Mill Creek near Avoca, MI	Lat 43°03'16", long 82°44'05", in NW¼ sec.8, T.7 N., R.15 E., St. Clair County, on left bank at downstream side of bridge on Bricker Road, 0.2 mile upstream from Gleason Drain, and 2.3 miles west of Avoca.	169	1963-75‡, 1976-77	09-26-77	4.70	620
*04160350	Pine River near Rattle Run, MI	Lat 42°52'49", long 82°34'04", in NE¼ sec.9, T.5 N., R.16 E., St. Clair County, on right downstream wingwall of bridge on Gratiot Road, 1.9 miles northeast of Rattle Run.	135	1974-77	04-23-77	14.45	1,000
		Streams tributary to Lake St. Clair					
04161500	Paint Creek near Lake Orion, MI	Lat 42°46'03", long 83°13'12", in NE¼ sec.13, T.4 N., R.10 E., Oakland County, on left bank 100 feet upstream from railroad bridge, 1.6 miles southeast of Lake Orion, and 2.8 miles upstream from Trout Creek.	38.5	1959-75‡, 1976-77	03-27-77 04-01-77	i	b110
04161760	West Branch Stony Creek near Washington, MI	Lat 42°43'53", long 83°06'02", in SE¼ sec.25, T.4 N., R.11 E., Oakland County, at bridge on Huron-Clinton Metropolitan Park Road, and 3.4 miles west of Washington.	22.5	1965-77	03-04-77	3.12	110
04164010	North Branch Clinton River at Almont, MI	Lat 42°54'59", long 83°02'42", in NE¼ sec.28, T.6 N., R.12 E., Lapeer County, at bridge on State Highway 53, at Almont.	9.56	1959-62, 1963-68‡, 1969-77	--	<3.72	<167
04164050	North Branch Clinton River near Romeo, MI	Lat 42°49'11", long 82°58'35", in NW¼ sec.31, T.5 N., R.13 E., Macomb County, at bridge on 33 Mile Road, 2.2 miles northeast of Romeo.	49.7	1959-64, 1965-69‡, 1970-77	03-29-77	2.51	180

See footnotes at end of the table

Annual maximum discharge at crest-stage partial-record stations during water year 1977--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (ft^3/s)
		Streams tributary to Lake St. Clair--Continued					
04164150	North Branch Clinton River near Meade, MI	Lat 42°43'50", long 82°54'23", in NE¼ sec.34, T.4 N., R.13 E., Macomb County, on left bank at bridge on 27 Mile Road, 1.9 miles northwest of Meade.	89.6	1959-67, 1968-72‡, 1973-77	03-06-77	5.78	773
04164200	Coon Creek near Armada, MI	Lat 42°47'41", long 82°52'58", in SW¼ sec.1, T.4 N., R.13 E., Macomb County, at bridge on North Road, 3.4 miles south of Armada.	10.0	1959-65, 1966-70‡, 1971-77	03-04-77	4.80	86
04164250	Tupper Brook at Ray Center, MI	Lat 42°45'42", long 82°54'04", in NW¼ sec.23, T.4 N., R.13 E., Macomb County, at bridge on 29 Mile Road, at Ray Center.	8.62	1959, 1960-64‡, 1965-77	04-23-77	5.03	137
04164350	Highbank Creek near Armada, MI	Lat 42°28'24", long 82°51'08", in NW¼ sec.6, T.4 N., R.14 E., Macomb County, at bridge on 32 Mile Road, 3.0 miles southeast of Armada.	14.9	1959-65, 1966-70‡, 1971-77	03-04-77	14.74	345
04164360	East Branch Coon Creek near New Haven, MI	Lat 42°45'46", long 82°50'57", in NW¼ sec.19, T.4 N., R.14 E., Macomb County, at bridge on 29 Mile Road, 3.4 miles northwest of New Haven.	36.1	1959-67, 1967-72‡, 1973-77	03-05-77	7.19	598
04164400	Deer Creek near Meade, MI	Lat 42°42'39", long 82°51'32", in NW¼ sec.6, T.3 N., R.14 E., Macomb County, at bridge on 25½ Mile Road, 0.9 mile southeast of Meade.	12.7	1959-60, 1961-65‡, 1966-77	04-23-77	6.24	344
04164450	McBride Drain near Macomb, MI	Lat 42°41'14", long 82°55'14", in NE¼ NE¼ sec.16, T.3 N., R.13 E., Macomb County, at bridge on 24 Mile Road, 2.2 miles southeast of Macomb.	5.79	1960-64‡, 1965-77	03-05-77	8.09	118
04164600	Middle Branch Clinton River near Macomb, MI	Lat 42°42'03", long 82°59'44", in SE¼ sec.2, T.3 N., R.12 E., Macomb County, at bridge on Schoenherr Road, 2.0 miles west of Macomb.	22.2	1959-64, 1965-69‡, 1971-77	03-28-77	9.45	444
04165200	Gloede Ditch near Waldenburg, MI	Lat 42°37'39", long 82°57'10", in SW¼ sec.32, T.3 N., R.13 E., Macomb County, 2.2 miles south of Waldenburg.	16.0	1959, 1960-64‡, 1965-77	04-03-77	16.82	345
		Streams tributary to Detroit River					
04168660	Frank and Poet Drain at Trenton, MI	Lat 42°09'19", long 83°12'22", in NW¼ sec.13, T.4 S., R.10 E., Wayne County, at bridge on King Road, at Trenton.	19.3	1972-77	04-26-77	8.55	370
		Streams tributary to Lake Erie					
04168800	Huron River near Andersonville, MI	Lat 42°41'35", long 82°29'56", in NW¼ SE¼ sec.3, T.3 N., R.8 E., Oakland County, on downstream side of culvert on White Lake Road, 2.5 miles south of Andersonville.	14.0	1974-77	--	<1.95	<58
04169500	Huron River at Commerce, MI	Lat 42°35'25", long 83°29'05", in NE¼ SE¼ sec.10, T.2 N., R.8 E., Oakland County, on downstream left abutment of bridge on Commerce Road, 10 feet upstream from Hayes Creek, and 0.2 miles east of Commerce.	57.3	1946-75‡, 1976-77	03-29-77	2.15	111
04172500	Portage River near Pinckney, MI	Lat 42°25'40", long 83°57'35", in SW¼ sec.34, T.1 N., R.4 E., Livingston County, at bridge on Tiplady Road, 2.0 miles upstream from Little Portage Lake, and 2.2 miles southwest of Pinckney.	79.1	1945-71‡, 1972-77	03-29-77	3.62	147

See footnotes at end of the table

Annual maximum discharge at crest-stage partial-record stations during water year 1977--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (ft^3/s)
		Streams tributary to Lake Erie--Continued					
04173250	Mill Creek near Lima Center, MI	Lat 42°15'56", long 83°56'45", in NE¼ sec.34, T.2 S., R.4 E., Washtenaw County, at Guenther Road, 2.0 miles upstream from North Fork Mill Creek, and 2.2 miles south of Lima Center.	47.3	1973-77	03-04-77	7.82	295

‡ Operated as a continuous-record gaging station.
* Also a low-flow partial-record station.
< Less than.
a Bridge removed for bridge maintenance.
b Estimated; gage height unknown.
c Maximum gage height, 14.08 ft Apr. 11, 1977, backwater from ice.
d Maximum gage height, 3.74 ft Mar. 15, 1977, backwater from ice.
e Occurred Feb. 25, 1977, backwater from ice.
f Maximum discharge not determined.
g Maximum gage height, 8.90 ft Mar. 5, 1977, backwater from ice.
h Approximately.
i Maximum stage not determined.
j Backwater from ice.
k Maximum gage height, 5.00 ft Mar. 29, 1977, backwater from ice.
m Maximum gage height recorded.

Measurements of streamflow at points other than gaging stations or partial-record stations are given in the following table. Those that are measurements of base flow are designated by an asterisk(*).

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1977

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Superior				
Montreal River	Lake Superior	Lat 46°32'41", long 90°24'06", in NW¼ sec.23, T.48 N., R.49 W., Michigan meridian, Gogebic County, at discontinued gaging station, 2.0 miles upstream from mouth and 3.5 miles north of Saxon, WI.	262	1938-70a	07-20-77 08-25-77	b35.9 b150
Plymouth Mine Pond Outlet	Alward Creek	Lat 46°28'14", long 89°58'56", in SE¼ NW¼ sec.18, T.47 N., R.45 W., Gogebic County, at culvert on Plymouth Road, at Ramsay, MI.	-	1974-76	06-15-77	*.55
Mineral River	Lake Superior	Lat 46°44'00", long 89°33'46", in N½ sec.16, T.50 N., R.42 W., Ontonagon County, at bridge on State Highway 64, 1.5 miles southeast of White Pine, MI.	6.80	1942,1970, 1975-76	06-14-77 07-19-77 08-15-77	*.51 *.14 *c.01
do	do	Lat 46°45'44", long 89°34'30", in NE¼ sec.5, T.50 N., R.42 W., Ontonagon County, at bridge on State Highway 64, at White Pine, MI.	10.5	1952,1970, 1975-76	06-14-77 07-19-77 08-15-77	*2.72 *.48 *c.09
Sturgeon River	Portage Lake	Lat 46°40'18", long 88°36'55", in NE¼ SE¼ sec.6, T.49 N., R.35 W., Houghton County, at bridge on U.S. Forest Service Road 193, 4.5 miles southwest of Prickett Dam, and 13 miles southwest of L'Anse, MI.	d335	1969-70, 1976	11-16-76 05-25-77	*104 *207
do	do	Lat 46°44'51", long 88°37'42", in NE¼ NW¼ sec.12, T.50 N., R.35 W., Baraga County, 400 ft upstream from Clear Creek, 2.0 miles downstream from Prickett Dam, and 6.5 miles southwest of Baraga, MI.	348	-	06-20-77	b29.0
Clear Creek	Sturgeon River	Lat 46°44'55", long 88°37'40", in NE¼ NW¼ sec.12, T.50 N., R.35 W., Baraga County, 50 ft upstream from mouth, 6.5 miles southwest of Baraga, MI.	d20	-	06-20-77	*11.2
Sturgeon River	Portage Lake	Lat 46°47'08", long 88°37'07", in NE¼ SE¼ sec.28, T.51 N., R.34 W., Baraga County, at bridge on State Highway 38, 6.0 miles downstream from Prickett Dam, 6.0 miles west of Baraga, MI.	379	1927-31a, 1943-47a, 1969	08-18-69 05-24-77 06-01-77	be42.8 b52.7 b59.6
Anna River	South Bay	Lat 46°23'01", long 86°41'02", NW¼ SE¼ sec.16, T.46 N., R.19 W., Alger County, 150 ft downstream from mouth of Valley Spur Creek, 2.0 miles southwest of Munising, MI.	d12	-	02-08-77	*15.9
do	do	Lat 46°23'23", long 86°38'59", NE¼ NW¼ sec.14, T.46 N., R.19 W., Alger County, 150 ft upstream from mouth of Wagner Creek, 1.0 mile south of Munising, MI.	d15	1976	02-08-77	*28.7
do	do	Lat 46°24'12", long 86°38'52", NW¼ NE¼ sec.11, T.46 N., R.19 W., Alger County, at bridge on State Highway 28, at Munising, MI.	d20	1949,1950, 1960, 1969-70, 1976	02-08-77	*36.8
		Streams tributary to Lake Michigan				
Bills Creek	Whitefish River	Lat 45°57'09", long 86°55'28", in SE¼ NW¼ sec.15, T.41 N., R.21 W., Delta County, 0.4 mile upstream from mouth, 2.7 miles northeast of Rapid River, MI.	d23	1973-74, 1976	05-13-77 07-20-77	*14.3 *4.31
Ely Creek	Schweitzer Creek	Lat 46°28'14", long 87°39'29", in NE¼ SE¼ sec.15, T.47 N., R.27 W., Marquette County, at dam on outlet of Lake Sally, 1.0 mile south of Ishpeming, MI.	-	-	08-09-77	*0
do	do	Lat 46°28'04", long 87°39'52", in NW¼ SE¼ sec.15, T.47 N., R.27 W., Marquette County, 0.5 mile downstream from dam on outlet of Lake Sally, 1.3 miles south of Ishpeming, MI.	-	-	08-09-77	*.02
do	do	Lat 46°27'32", long 87°40'56", in SW¼ NE¼ sec.21, T.47 N., R.27 W., Marquette County, at bridge on county road, at National Mine, MI.	-	-	08-09-77	*.33

See footnotes at end of the table

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1977--CONTINUED

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements	
					Date	Discharge (ft^3/s)
		Streams tributary to Lake Michigan--Continued				
Ely Creek	Schweitzer Creek	Lat 46°26'58", long 87°40'52", in SE¼ SE¼ sec.21, T.47 N., R.27 W., Marquette County, at bridge on county road, 0.6 mile south of National Mine, MI.	-	-	08-09-77	*.82
do	do	Lat 46°26'03", long 87°41'26", in NE¼ NW¼ sec.33, T.47 N., R.27 W., Marquette County, at bridge on County Highway 476, 1.5 miles south of National Mine, MI.	9.25	1961-65f, 1976	08-09-77	*1.33
Sunset Creek	Iron River	Lat 46°08'22", long 88°36'28", in SE¼ NW¼ sec.7, T.43 N., R.34 W., Iron County, at outlet of Sunset Lake, 3.5 miles northeast of Iron River, MI.	11.5	1974-76	10-20-76	*0
Costigan Creek	Sunset Creek	Lat 46°08'10", long 83°37'49", in NE¼ SW¼ sec.12, T.43 N., R.35 W., Iron County, 50 ft upstream from mouth, 2.5 miles north of Iron River, MI.	d3	-	05-17-77	*2.68
Baw Beese Lake Outlet	St. Joseph River	Lat 41°54'18", long 84°37'01", in NE¼ SE¼ sec.35, T.6 S., R.3 W., Hillsdale County, at Lakeview Road, at Hillsdale, MI.	5.10	1974-76	03-15-77	14.7
King Lake Outlet	do	Lat 41°54'26", long 84°37'28", in NE¼ NW¼ sec.35, T.6 S., R.3 W., Hillsdale County, at Steamburg Road, at Hillsdale, MI.	4.19	1974-76	11-23-76	*.56
St. Joseph River	Lake Michigan	Lat 41°55'45", long 84°38'22", in SW¼ SE¼ sec.22, T.6 S., R.3 W., Hillsdale County, at Fayette Street, at Hillsdale, MI.	12.4	1974-76	11-17-76 01-05-77 02-11-77 02-24-77	*2.51 *2.30 *5.76 32.4
do	do	Lat 41°56'04", long 84°38'26", in NE¼ sec.22, T.6 S., R.3 W., Hillsdale County, just below sewage treatment plant, at Hillsdale, MI.	-	1970, 1974	08-25-77	*g1.51
Beebe Creek	St. Joseph River	Lat 41°57'04", long 84°34'26", in SW¼ NW¼ sec.17, T.6 S., R.2 W., Hillsdale County, at Lake Pleasant Road, 3.0 miles northwest of Hillsdale, MI.	24.6	1974-76	02-07-77 03-30-77	*2.12 92.5
Unnamed tributary	Unnamed tributary	Lat 41°58'02", long 84°35'35", in NW¼ sec.7, T.6 S., R.2 W., Hillsdale County, at Milnes Road, 3.5 miles northwest of Hillsdale, MI.	.70	1974-76	12-06-76 12-17-76 02-24-77 03-16-77	*.28 *.30 6.30 *.66
do	Beebe Creek	Lat 41°57'49", long 84°35'48", in SE¼ NE¼ sec.12, T.6 S., R.3 W., Hillsdale County, at Ball Road, 3.5 miles northeast of Hillsdale, MI.	10.8	1974-76	11-04-76 03-30-77	*2.36 34.1
St. Joseph River	Lake Michigan	Lat 41°57'23", long 84°39'31", in SW¼ SE¼ sec.9, T.6 S., R.3 W., Hillsdale County, at Moore Road, 1.2 miles northwest of Hillsdale, MI.	62.4	1967,1971, 1974-76	11-01-76 03-08-77	*17.8 136
do	do	Lat 41°58'58, long 84°39'52", in NE¼ NW¼ sec.4, T.6 S., R.3 W., Hillsdale County, at Chicago Street (US-12), at Jonesville, MI.	66.5	1974-76	10-12-76 11-01-76 02-01-77 05-16-77 05-25-77 08-25-77	*20.5 *21.4 *13.4 115 *17.6 *g11.4
Butternut Creek	St. Joseph River	Lat 41°58'58", long 84°42'35", in NW¼ NW¼ sec.6, T.6 S., R.3 W., Hillsdale County, at New York Central Railroad bridge, 1.5 miles west of Jonesville, MI.	1.88	1976	12-08-76 12-16-76 02-24-77 03-16-77 05-24-77	*.34 *.30 9.68 *1.25 *.26
St. Joseph River	Lake Michigan	Lat 42°02'37", long 84°45'52", in NW¼ NW¼ sec.15, T.5 S., R.4 W., Hillsdale County, at Litchfield Road, at Litchfield, MI.	81.0	1974-76	11-01-76 12-10-76 04-14-77 05-13-77	*27.4 *20.7 *76.9 *42.6
Sand Creek	St. Joseph River	Lat 41°55'21", long 84°41'55", in SW¼ SW¼ sec.18, T.6 S., R.3 W., Hillsdale County, at Sand Lake Road, 4.0 miles northwest of Hillsdale, MI.	9.44	1974-76	10-12-76 11-23-76 01-20-77 03-31-77 05-25-77	*6.41 *4.19 *3.16 17.5 *5.52

See footnotes at end of the table

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1977--CONTINUED

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Michigan--Continued				
Sand Creek	St. Joseph River	Lat 42°03'04", long 84°48'22", in SW¼ NW¼ sec.8, T.5 S., R.4 W., Hillsdale County, at mouth, near Storms Road, 2.5 miles west of Litchfield, MI.	23.2	1974-76	10-29-76 04-11-77	*10.8 *31.9
St. Joseph River	Lake Michigan	Lat 42°03'34", long 84°48'27", in SE¼ sec.6, T.5 S., R.4 W., Hillsdale County, at bridge on Hadley Road, 2.0 miles northwest of Litchfield, MI.	-	-	05-06-77	85.0
do	do	Lat 42°04'21", long 84°49'50", in SE¼ SE¼ sec.36, T.4 S., R.5 W., Calhoun County, at South County Line Road, 4.0 miles northwest of Litchfield, MI.	-	1974-76	05-06-77	100
Soap Creek	St. Joseph River	Lat 42°00'32", long 84°47'15", in SW¼ NW¼ sec.28, T.5 S., R.4 W., Hillsdale County, at McLain Road, 4.0 miles southwest of Litchfield, MI.	4.66	1974-76	05-25-77	*1.26
do	do	Lat 42°04'07", long 84°50'04", in NW¼ NE¼ sec.1, T.5 S., R.5 W., Branch County, at Ely Road, 6.0 miles northwest of Litchfield, MI.	13.1	1974-76	10-29-76 02-02-77 04-11-77 05-06-77	*4.12 *3.02 *17.9 *15.1
St. Joseph River	Lake Michigan	Lat 42°06'04", long 84°50'38", in NW¼ NW¼ sec.25, T.4 S., R.5 W., Calhoun County, at bridge on T-Drive South, 3.0 miles southwest of Homer, MI.	-	1975-76	05-09-77	*79.1
Portage Creek	Portage River	Lat 42°05'39", long 85°31'46", in NE¼ sec.25, T.4 S., R.11 W., Kalamazoo County, at bridge on 24th Street, 1.7 miles south of Vicksburg, MI.	53.9	1964, 1966-67, 1975	08-25-77	*g23.0
Spring Creek	Flowerfield Creek	Lat 42°08'50", long 85°36'25", in NE¼ sec.5, T.5 S., R.11 W., St. Joseph County, at bridge on Muskrat Road, 4.5 miles northwest of Parkville, MI.	10.9	1964, 1966-67	03-25-77	*g5.70
Lake of the Woods Drain	Dowagiac River	Lat 42°05'04", long 86°02'15", in NW¼ NE¼ sec.34, T.4 S., R.15 W., Van Buren County, at bridge on 92nd Avenue, 3.0 miles southwest of Decatur, MI.	13.1	1962-63	08-24-77	*g4.66
Dowagiac River	St. Joseph River	Lat 42°01'39", long 86°06'26", in SE¼ SE¼ sec.13, T.5 S., R.16 W., Cass County, at bridge on State Highway 51, 2.0 miles north of Dowagiac, MI.	-	-	08-24-77	*g55.0
Silver Creek	Dowagiac River	Lat 42°02'03", long 86°07'25", in SW¼ NW¼ sec.13, T.5 S., R.16 W., Cass County, at bridge on Downey Street, 2.7 miles northwest of Dowagiac, MI.	-	-	08-24-77	*g2.43
Dowagiac Creek	Dowagiac River	Lat 41°59'01", long 86°00'10", in NE¼ NW¼ sec.1, T.6 S., R.15 W., Cass County, at bridge on Dutch Settlement Road, 3.5 miles east of Dowagiac, MI.	-	-	08-24-77	*g22.6
do	do	Lat 41°58'39", long 86°06'29", in SW¼ NW¼ sec.6, T.6 S., R.15 W., Cass County, at bridge on Wilbur Hill Road at Dowagiac, MI.	-	-	08-24-77	*g35.1
Dowagiac River	St. Joseph River	Lat 41°57'21", long 86°10'56", in SW¼ SW¼ sec.9, T.6 S., R.16 W., Cass County, at bridge on Peavine Street, 4.0 miles southwest of Dowagiac, MI.	-	-	08-24-77	*g126
Gates Drain	Paw Paw River	Lat 42°10'18", long 85°54'29", in SE¼ SW¼ sec.26, T.3 S., R.14 W., Van Buren County, at bridge on 68th Street, 3.0 miles south of Paw Paw, MI.	26.0	1962-64	08-24-77	*g12.4
East Branch Paw Paw River	do	Lat 42°12'45", long 85°53'27", in NE¼ NW¼ sec.13, T.3 S., R.14 W., Van Buren County, at bridge on State Highway 119, at Paw Paw, MI.	31.5	1962-64	08-24-77	*g22.4
North Branch Paw Paw River	Paw Paw River	Lat 42°17'55", long 85°49'54", in SW¼ NE¼ sec.16, T.2 S., R.13 W., Van Buren County, at bridge on State Highway 43, 2.5 miles northeast of Paw Paw, MI.	30.6	1962-64	08-24-77	*g40.2
do	do	Lat 42°15'58", long 85°53'35", in SE¼ NW¼ sec.25, T.2 S., R.14 W., Van Buren County, at bridge on 3550th Street, 2.5 miles north of Paw Paw, MI.	63.5	1962-64	08-24-77	*g49.6

See footnotes at end of the table

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1977--CONTINUED

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Michigan--Continued				
North Extension Drain	North Branch Paw Paw River	Lat 42°16'49", long 85°53'51", in SE¼ NE¼ sec.23, T.2 S., R.14 W., Van Buren County, at bridge on 38th Avenue, 3.0 miles north of Paw Paw, MI.	-	-	08-24-77	*g3.56
Paw Paw River	St. Joseph River	Lat 42°13'22", long 86°09'57", in NW¼ SW¼ sec.10, T.3 S., R.16 W., Van Buren County, at bridge on 64th Street, 0.5 mile north of Hartford, MI.	-	-	08-24-77	*g77.9
Unnamed tributary	North Branch Kalamazoo River	Lat 42°04'43", long 84°30'45", in SW¼ sec.35, T.4 S., R.2 W., Jackson County, at spring 1,000 feet east of Moscow Road and 700 feet north of Farewell Lake Road, 2.0 miles north of Moscow, MI.	-	-	12-01-76	*g1.49
Battle Creek	Kalamazoo River	Lat 42°26'35", long 85°02'00", in NW¼ sec.28, T.1 N., R.6 W., Eaton County, at bridge on State Highway 78, at Bellevue, MI.	178	1948-53a	11-24-76	*34.7
Comstock Creek	do	Lat 42°19'58", long 85°27'02", in NW¼ sec.2, T.2 S., R.10 W., Kalamazoo County, at culvert on G Avenue, 4.0 miles northeast of Comstock, MI.	-	-	08-04-77 09-12-77	*.81 *.86
do	do	Lat 42°19'03", long 85°29'08", in NW¼ sec.9, T.2 S., R.10 W., Kalamazoo County, at culvert on H Avenue, 2.8 miles northeast of Comstock, MI.	14.8	1969, 1976	05-26-77 08-04-77 09-12-77	*5.13 *3.99 *4.14
Grand River	Lake Michigan	Lat 42°10'08", long 84°23'02", in SE¼ NE¼ sec.35, T.3 S., R.1 W., Jackson County, at bridge on Draper Road, 2.0 miles south of Vandercook, MI.	41.0	1961, 1963-65f, 1974-76	04-14-77 07-15-77 08-02-77	*g31.0 *g6.67 *g4.86
do	do	Lat 42°13'03", long 84°21'03", in NE¼ NE¼ sec.18, T.3 S., R.1 E., Jackson County, at bridge on South Street, 2.8 miles northeast of Vandercook, MI.	-	-	07-15-77 08-02-77	*g10.3 *g5.60
Center Lake Outlet	Grand River	Lat 42°13'41", long 84°19'41", in NE¼ NE¼ sec.8, T.3 S., R.1 E., Jackson County, at bridge on Hoyer Road, .3 mile south of Michigan Center, MI.	-	-	07-15-77 08-02-77	*g1.77 *g1.30
Grand River	Lake Michigan	Lat 42°14'17", long 84°23'34", in NW¼ SE¼ sec.2, T.3 S., R.1 W., Jackson County, at Penn. Central railway bridge, in Jackson, MI.	-	-	08-02-77	*g11.3
Portage River	Grand River	Lat 42°19'17", long 84°20'19", in SW¼ SE¼ sec.5, T.2 S., R.1 E., Jackson County, at bridge on Hawkins Road, 6.5 miles northeast of Jackson, MI.	-	-	08-02-77	*g15.1
Grand River	Lake Michigan	Lat 42°23'36", long 84°24'47", in SE¼ sec.10, T.1 S., R.1 W., Jackson County, at bridge on Lansing Road, 3.0 miles northeast of Rives Junction, MI.	-	1963	08-02-77	*g48.3
Huntoon Creek	Grand River	Lat 42°27'04", long 84°25'39", in SE¼ SE¼ sec.20, T.1 N., R.1 W., Ingham County, at bridge on Bellevue Road, in the village of Leslie, MI.	-	-	08-02-77	*g.91
Grand River	Lake Michigan	Lat 42°23'26", long 84°32'31", in NW¼ sec.15, T.1 S., R.2 W., Jackson County, at bridge on Tompkins Road, 1.0 mile north of Tompkins Center, MI.	-	1963	08-02-77	*g73.3
Red Cedar River	Grand River	Lat 42°43'20", long 84°26'36", in NE¼ NW¼ sec.21, T.4 N., R.1 W., Ingham County, at bridge on Indian Hills Golf Course, in Okemos, MI.	-	-	07-15-77	*g27.0
Looking Glass River	do	Lat 42°51'07", long 84°30'12", in NW¼ NW¼ sec.2, T.5 N., R.2 W., Clinton County, 2.0 miles east of U.S. Highway 27, and 1.2 miles east of East DeWitt, MI.	-	-	06-13-77 07-27-77 08-16-77	*g19.3 *g7.04 *g8.23
Remey Chandler Drain	Looking Glass River	Lat 42°50'31", long 84°32'10", in SE¼ SW¼ sec.3, T.5 N., R.2 W., Clinton County, at bridge on Howe Road, 0.8 mile southeast of East DeWitt, MI.	-	-	08-16-77	*g.36

See footnotes at end of the table

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1977--CONTINUED

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Michigan--Continued				
Looking Glass River	Grand River	Lat 42°50'53", long 84°32'34", in SW¼ sec.3, T.5 N., R.2 W., Clinton County, at bridge on U.S. Highway 27, 0.3 mile south of East DeWitt, MI.	-	-	06-13-77 07-27-77 08-16-77	*g24.2 *g10.4 *g11.2
do	do	Lat 42°50'24", long 84°34'08", in NE¼ sec.8, T.5 N., R.2 W., Clinton County, at bridge on Bridge Street, in DeWitt, MI.	234	1961-67	06-13-77 07-13-77 07-27-77 08-16-77	*g25.7 *g18.7 *g13.3 *g14.9
do	do	Lat 42°49'09", long 84°36'09", in NE¼ sec.13, T.5 N., R.3 W., Clinton County, at bridge on Airport Road, 2.0 miles southwest of DeWitt, MI.	-	-	06-13-77 07-12-77 07-27-77 08-16-77	*g31.4 *g24.1 *g16.7 *g18.0
Summers Drain	Looking Glass River	Lat 42°48'47", long 84°38'45", in SE¼ SE¼ sec.15, T.5 N., R.3 W., Clinton County, at bridge on Clark Road, 3.0 miles southeast of Wacousta, MI.	-	-	08-16-77	*g.44
Looking Glass River	Grand River	Lat 42°49'06", long 84°39'41", in NW¼ sec.15, T.5 N., R.3 W., Clinton County, at bridge on Francis Road, 2.0 miles southeast of Wacousta, MI.	-	-	06-13-77 07-12-77 07-27-77 08-16-77	*g34.7 *g26.6 *g17.8 *g20.1
do	do	Lat 42°49'23", long 84°42'02", in NW¼ sec.17, T.5 N., R.3 W., Clinton County, at the City Park, in Wacousta, MI.	-	-	06-14-77 07-11-77 07-27-77 08-16-77	*g37.0 *g27.8 *g18.9 *g21.3
do	do	Lat 42°50'10", long 84°46'53", in NE¼ sec.15, T.5 N., R.4 W., Clinton County, at bridge on Tallman Road, 3.0 miles west of Wacousta, MI.	-	-	06-14-77 07-11-77	*g38.0 *g31.2
Crockery Creek	do	Lat 43°13'16", long 85°54'09", in SW¼ SW¼ sec.30, T.10 N., R.13 W., Muskegon County, at the village limits of Slocum, MI.	-	-	09-14-77	*g10.0
Crockery Lake Outlet	North Branch Crockery Creek	Lat 43°11'30", long 85°52'53", in SE¼ SW¼ sec.5, T.9 N., R.13 W., Ottawa County, at bridge on Truman Road, 3.0 miles east of Ravenna, MI.	-	1971	09-14-77	*g.29
North Branch Crockery Creek	Crockery Creek	Lat 43°11'42", long 85°53'21", in NW¼ SW¼ sec.5, T.9 N., R.13 W., Ottawa County, at bridge on 40th Avenue, 2.5 miles northeast of Ravenna, MI.	-	1971	09-14-77	*g2.47
Crockery Creek	Grand River	Lat 43°09'44", long 85°57'47", in SW¼ SW¼ sec.15, T.9 N., R.14 W., Muskegon County, at bridge on Ellis Road, 2.0 miles southwest of Ravenna, MI.	-	1971	09-14-77	*g14.6
Guyer Creek	Lake Michigan	Lat 45°21'35", long 85°08'15", in SE¼ SW¼ sec.25, T.32 N., R.9 W., Antrim County, at bridge on Old Dixie Highway, 2.0 miles north of Eastport, MI.	-	-	06-06-77 08-11-77	g.92 6.21
Intermediate River	Lake Bellaire	Lat 44°58'30", long 85°12'48", in NE¼ NE¼ sec.25, T.30 N., R.8 W., Antrim County, at bridge on Bellaire Highway, in Bellaire, MI.	-	-	05-09-77 08-02-77	g182 g198
Clam River	Torch Lake	Lat 44°56'32", long 85°17'00", in SE¼ NW¼ sec.4, T.29 N., R.8 W., Antrim County, at bridge on Torch Lake Road, in Clam River, MI.	-	-	05-09-77 08-02-77	g282 g252
Jordan River	Lake Charlevoix	Lat 45°02'10", long 84°58'06", in NW¼ SE¼ sec.31, T.31 N., R.5 W., Antrim County, at bridge on Jordan River Road, 4.0 miles north of Alba, MI.	-	-	03-02-77 04-12-77 05-10-77 06-07-77 08-02-77 09-06-77	g44.8 g46.3 g47.4 g45.5 g57.9 g49.4
do	do	Lat 45°00'51", long 85°01'44", in NE¼ NE¼ sec.9, T.30 N., R.6 W., Antrim County, at Pinney Bridge, 4.0 miles northwest of Alba, MI.	29.6	1968, 1971	04-12-77 05-10-77 06-07-77	g134 g123 g118
do	do	Lat 45°07'58", long 85°07'28", in NE¼ NE¼ sec.35, T.32 N., R.7 W., Charlevoix County, at Rogers Bridge, 1.5 miles south of East Jordan, MI.	-	-	03-02-77 04-12-77 05-10-77 06-07-77 07-06-77 08-02-77 09-06-77	g183 g253 g185 g174 g179 g239 g204

See footnotes at end of the table

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1977--CONTINUED

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Michigan--Continued				
Deer Creek	Jordan River	Lat 45°08'08", long 85°07'09", in SW¼ SW¼ sec.25, T.32 N., R.7 W., Charlevoix County, at bridge on State Highway 32, 1.0 mile south of East Jordan, MI.	-	-	03-02-77 04-12-77 05-10-77 06-07-77	g48.6 g104 g48.0 g40.8
Brown Creek	do	Lat 45°09'10", long 85°07'16", in NE¼ SE¼ sec.23, T.32 N., R.7 W., Charlevoix County, at bridge on State Highway 32, in East Jordan, MI.	-	-	03-01-77 04-11-77 05-10-77 06-06-77 07-05-77 08-01-77 09-06-77	g2.24 g5.19 g2.50 g2.70 g2.38 g2.17 g6.38
Monroe Creek	Lake Charlevoix	Lat 45°10'44", long 85°09'51", in SE¼ SE¼ sec.9, T.32 N., R.7 W., Charlevoix County, at culvert on State Highway 66, 2.5 miles northwest of East Jordan, MI.	9.73	1973	03-02-77 04-11-77 05-10-77 06-07-77 07-06-77 09-07-77	g7.55 g41.3 g7.93 g5.95 g4.17 g20.1
Porter Creek	do	Lat 45°13'06", long 85°04'22", in NW¼ NW¼ sec.32, T.33 N., R.6 W., Charlevoix County, at culvert on county road, at Advance, MI.	17.4	1973	03-01-77 04-11-77 05-10-77 06-06-77 07-05-77 09-06-77	g21.8 g50.4 g13.0 g16.9 g9.26 g35.9
Horton Creek	do	Lat 45°17'19", long 85°05'11", in NW¼ NE¼ sec.6, T.33 N., R.6 W., Charlevoix County, at culvert on county road, 0.5 mile north of Horton Bay, MI.	11.8	1973	03-01-77 04-11-77 05-10-77 06-06-77	g23.4 g30.6 g17.6 g19.5
Loab Creek	do	Lat 45°16'48", long 85°13'56", in SE¼ SW¼ sec.1, T.33 N., R.8 W., Charlevoix County, at culvert on State Highway 66, 2.4 miles south of Charlevoix, MI.	5.69	1973	03-02-77 04-11-77 05-10-77 06-07-77 07-06-77 09-07-77	g3.61 g21.7 g3.33 g.67 g.23 g7.79
Strover Creek	do	Lat 45°18'02", long 85°14'59", in NW¼ SE¼ sec.35, T.33 N., R.8 W., Charlevoix County, 100 ft upstream from mouth, and 1.0 mile south of Charlevoix, MI.	-	-	06-07-77 07-06-77 08-11-77 09-07-77	g1.74 g1.04 g2.33 g7.27
Bear River	Little Traverse Bay	Lat 45°22'27", long 84°57'38", in NE¼ NE¼ sec.6, T.34 N., R.5 W., Emmet County, at bridge on U.S. Highway 31, at Petoskey, MI.	-	-	04-04-77 06-06-77	375 g57.0
		Streams tributary to Lake Huron				
Au Sable River	Lake Huron	Lat 44°40'36", long 84°13'05", in SW¼ NE¼ sec.5, T.26 N., R.2 E., Oscoda County, on right bank at Gardner's Cabin, 3.4 miles upstream from Camp Ten Bridge, and 4.7 miles north of Mio, MI.	-	-	08-03-77 08-04-77	b778 b736
Unnamed tributary	Au Sable River	Lat 44°40'12", long 84°12'12", in SW¼ SE¼ sec.4, T.26 N., R.2 E., Oscoda County, 200 ft upstream from mouth, and 3.7 miles northwest of Mio, MI.	-	-	08-04-77	*1.88
Antler Creek	do	Lat 44°39'58", long 84°11'00", in NE¼ NW¼ sec.10, T.26 N., R.2 E., Oscoda County, at powerline crossing, 2.8 miles northwest of Mio, MI.	-	-	08-04-77	*.10
Honeywell Creek	do	Lat 44°42'00", long 84°10'15", in SW¼ NW¼ sec.35, T.27 N., R.2 E., Oscoda County, at bridge on Galbrith Road, 3.4 miles northwest of Mio, MI.	-	-	08-04-77	.66
do	do	Lat 44°40'52", long 84°09'00", in NW¼ NW¼ sec.1, T.26 N., R.2 E., Oscoda County, at bridge on Cherry Creek Road, 2.2 miles north of Mio, MI.	-	-	08-04-77	1.22
Au Sable River	Lake Huron	Lat 44°39'40", long 84°06'20", in SE¼ NW¼ sec.8, T.26 N., R.3 E., Oscoda County, 1.8 miles east of Mio, MI.	-	-	06-08-77	*g38.2
Van Etten Creek	Au Sable River	Lat 44°26'49", long 83°20'21", in SW¼ NW¼ sec.27, T.24 N., R.9 E., Iosco County, at Detroit and Mackinac Railroad Bridge, 2.0 miles northwest of Oscoda, MI.	-	1973-76	12-08-76	g126

See footnotes at end of the table

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1977--CONTINUED

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Huron--Continued				
South Branch Shiawassee River	Shiawassee River	Lat 42°36'57", long 83°57'54", in SE¼ SW¼ sec.27, T.3 N., R.4 E., Livingston County, at bridge on Grand River Road, 1.2 miles northwest of Howell, MI.	-	1973-74	08-24-77	*g6.94
White Creek	Cass River	Lat 43°30'47", long 83°18'34", in SE¼ SE¼ sec.29, T.13 N., R.10 E., Tuscola County, at bridge on Murray Road, 4.8 miles northeast of Caro, MI.	d146	1963-64, 1974	08-31-77	3.90
Pinnebog River	Lake Huron	Lat 43°55'14", long 83°07'32", in NE¼ NE¼ sec.12, T.17 N., R.11 E., Huron County, at bridge on Limerick Road, 1.5 miles southwest of Pinnebog, MI.	-	1973-76	12-08-76	g1.08
Spring Creek Drain	Potts Drain	Lat 43°15'22", long 82°49'01", in NW¼ NE¼ sec.34, T.10 N., R.14 E., Sanilac County, at bridge on Mill Street, in the village of Peck, MI.	-	-	02-08-77	*g.08
do	do	Lat 43°15'31", long 82°48'44", in SE¼ SE¼ sec.27, T.10 N., R.14 E., Sanilac County, at bridge on Peck Road, in the village of Peck, MI.	-	-	02-08-77	*g.20
		Streams tributary to Detroit River				
Franklin Branch	River Rouge	Lat 42°30'04", long 83°16'43", in NW¼ sec.16, T.1 N., R.10 E., Oakland County, at 12 Mile Road, at Southfield, MI.	17.0	1976	11-04-76 03-28-77	*5.20 112
Upper River Rouge	do	Lat 42°23'59", long 83°17'11", in NW¼ sec.20, T.1 S., R.10 E., Wayne County, at 5 Mile Road, at Redford, MI.	22.2	1967-68, 1976	11-04-76 03-28-77	*5.52 143
Bell Branch	Upper River Rouge	Lat 42°23'32", long 83°17'45", in SW¼ sec.20, T.1 S., R.10 E., Wayne County, at Beech Daily Road, at Redford, MI.	40.8	1967-68, 1976	11-04-76 03-29-77	*5.41 376
Walled Lake Branch	Johnson Drain	Lat 42°25'45", long 83°28'42", in NE¼ SE¼ sec.3, T.1 S., R.8 E., Wayne County, at Beal Street, 0.2 mile upstream from mouth, at Northville, MI.	24.6	1976	11-05-76 03-28-77	*7.05 104
Johnson Drain	Middle River Rouge	Lat 42°25'33", long 83°28'43", in SE¼ sec.3, T.1 S., R.8 E., Wayne County, at 7 Mile Road, at Northville, MI.	2o.1	1967-68, 1976	11-05-76 03-28-77	*5.96 87.7
Middle River Rouge	River Rouge	Lat 42°22'18", long 83°26'44", in SW¼ sec.25, T.1 S., R.8 E., Wayne County, at Haggerty Road, at Plymouth, MI.	60.7	1967-68, 1976	11-05-76	*17.9
do	do	Lat 42°21'05", long 83°22'22", in NE¼ NE¼ sec.4, T.2 S., R.9 E., Wayne County, at Ann Arbor Trail, downstream from Nankin Lake Dam, at Nankin Mills, MI.	63.4	1976	11-04-76	*24.3
Tonquish Creek	Middle River Rouge	Lat 42°21'07", long 83°23'10", in NW¼ sec.4, T.2 S., R.9 E., Wayne County, at Wayne Road, 0.7 mile west of Nankin Mills, MI.	24.2	1967-68, 1976	11-04-76	*3.19
Lower River Rouge	River Rouge	Lat 42°17'46", long 83°32'31", in NW¼ SW¼ sec.19, T.2 S., R.8 E., Wayne County, at Ridge Road, 0.7 mile south of Cherry Hill, MI.	7.34	1976	11-05-76	*.43
do	do	Lat 42°16'57", long 83°26'14", in SW¼ sec.25, T.2 S., R.8 E., Wayne County, at Lotz Road, 0.5 mile west of Wayne, MI.	37.5	1976	11-05-76 03-29-77	*1.29 494
Fellows Creek	Lower River Rouge	Lat 42°17'38", long 83°26'11", in NE¼ sec.25, T.2 S., R.8 E., Wayne County, at Palmer Road, 3.0 miles west of Wayne, MI.	16.0	1967-68, 1976	11-05-76	*2.88
		Streams tributary to Lake Erie				
Huron River	Lake Erie	Lat 42°40'11", long 83°29'19", in NE¼ NE¼ sec.15, T.3 N., R.8 E., Oakland County, at bridge on Teggerdine Road, 0.2 mile west of west end of Pontiac Lake.	-	-	05-03-77 06-08-77 07-11-77 08-08-77 09-12-77	g8.73 *g3.05 *g1.72 *g1.21 *g.33

See footnotes at end of the table

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1977--CONTINUED

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Erie--Continued				
Huron River	Lake Erie	at 42°39'27", long 83°27'29", in SW¼ sec.13, T.3 N., R.8 E., Oakland County, at bridge on State Highway 59, 1.5 miles northeast of Oxbow, MI.	-	-	05-03-77 06-08-77 07-11-77 08-08-77	g17.3 *g2.61 *g1.73 *g1.76
do	do	Lat 42°38'10", long 83°28'16", in NW¼ sec.26, T.3 N., R.8 E., Oakland County, at bridge on Avon Lea Road, 0.2 mile south of Oxbow Lake.	-	-	05-03-77 06-08-77 08-08-77	g22.9 *g.64 *g2.37
do	do	Lat 42°38'03", long 83°29'16", in NW¼ SE¼ sec.27, T.3 N., R.8 E., Oakland County, at bridge on Oxbow Lake Road, 0.5 mile south of Union Lake Road, 1.0 mile southwest of Oxbow, MI.	27.6	1966-67, 1969-70	05-03-77 06-08-77 07-11-77 08-08-77 09-12-77	g29.1 *g1.54 *g2.61 *g3.05 *g1.40
do	do	Lat 42°34'08", long 83°30'15", in SE¼ sec.16, T.2 N., R.8 E., Oakland County, at bridge on Benstein Road, at Commerce Lake Outlet, 3.5 miles northeast of Wixom, MI.	-	-	05-03-77 06-08-77 07-11-77 08-08-77 09-12-77	g78.0 *g23.8 *g17.7 *g17.1 *g8.67
Norton Creek	Huron River	Lat 42°31'26", long 83°32'32", in SE¼ sec.31, T.2 N., R.8 E., Oakland County, at bridge on Pontiac Trail, in Wixom, MI.	6.55	1969	05-03-77 06-08-77 07-11-77	bg3.78 bg4.40 *g1.69
do	do	Lat 42°32'36", long 83°33'02", in NE¼ SW¼ sec.30, T.2 N., R.8 E., Oakland County, south of Charms Road, below the Wixom Waste Water Treatment Plant, 1.5 miles northwest of Wixom, MI.	-	-	05-03-77 06-08-77 07-11-77 08-08-77 09-12-77	bg11.4 bg9.49 *g2.81 *g3.00 *g3.26
do	do	Lat 42°33'09", long 83°33'44", in NE¼ NE¼ sec.25, T.2 N., R.7 E., Oakland County, at Buno Road, 3.0 miles southeast of Milford, MI.	15.8	1966-69f, 1970-71, 1976	10-12-76	*9.16
Pettibone Creek	do	Lat 42°35'21", long 83°36'08", in SE¼ NE¼ sec.10, T.2 N., R.7 E., Oakland County, below the old powerhouse in Milford, MI.	-	-	05-03-77 06-08-77 07-12-77 08-08-77 09-13-77	g16.5 *g7.48 *g6.95 *g4.08 *g4.14
Woodruff Creek	do	Lat 42°40'00", long 83°42'34", in NW¼ sec.2, T.1 N., R.6 E., Livingston County, at Grand River Road, 4.5 miles west of New Hudson, MI.	36.3	1970, 1976	10-12-76	*14.7
Davis Creek	do	Lat 42°27'23", long 83°44'24", in NW¼ sec. 28, T.1 N., R.6 E., Livingston County, at bridge on Spicer Road, 1.8 miles west of South Lyon, MI.	-	-	05-04-77 06-09-77 07-12-77 08-08-77	g77.2 *g20.4 *g5.94 *g3.16
do	do	Lat 42°28'08", long 83°44'38", in NW¼ sec.21, T.1 N., R.6 E., Livingston County, at Silver Lake Road, 2.0 miles north of Whitmore Lake, MI.	66.5	1970-71, 1976	10-12-76	*13.5
Woodland Lake Outlet	South Ore Creek	Lat 42°32'38", long 83°46'54", in NW¼ NE¼ sec.30, T.2 N., R.6 E., Livingston County, at bridge on I-96, 1.0 mile north of Brighton, MI.	-	-	05-04-77 06-09-77 07-12-77 08-09-77	g25.1 *g4.01 *g2.48 *g2.52
do	do	Lat 42°31'42", long 83°46'54", in NE¼ NW¼ sec.31, T.2 N., R.6 E., Livingston County, below the Mill Pond in Brighton, MI.	-	-	05-04-77 06-09-77 07-12-77 08-09-77	g28.8 *g4.34 *g3.64 *g3.03
Brighton Lake Outlet	do	Lat 42°31'01", long 83°48'09", in SE¼ SW¼ sec.36, T.2 N., R.6 E., Livingston County, below the outlet structure of Brighton Lake at the Charles Howell Scout Reservation, 1.0 mile southwest of Brighton, MI.	-	-	05-04-77 06-09-77 07-12-77 08-09-77 09-13-77	g36.8 *g4.99 *g4.34 *g3.89 *g4.44
South Ore Creek	Huron River	Lat 42°29'52", long 83°48'09", in NW¼ sec.12, T.1 N., R.5 E., Livingston County, at bridge on Hamburg Road, 2.5 miles southwest of Brighton, MI.	33.7	1951-68a, 1970-71	10-12-76 09-13-77	*12.2 g24.5
Ore Lake Outlet	Huron River	Lat 42°28'23", long 83°47'49", in SW¼ SE¼ sec.13, T.1 N., R.5 E., Livingston County, at Ore Lake Outlet, 1.5 miles north of Hamburg, MI.	-	-	05-04-77 07-12-77	g46.4 *g9.27

See footnotes at end of the table

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1977--CONTINUED

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements Date	Measurements Discharge (ft^3/s)
		Streams tributary to Lake Erie--Continued				
Horseshoe Lake Outlet	Huron River	Lat 42°27'11", long 83°49'17", in NW¼ sec.26, T.1 N., R.5 E., Livingston County, at bridge on Merrill Road, 1.0 mile west of Hamburg, MI.	30.7	1970-71	10-12-76 05-04-77 06-09-77 07-12-77 08-08-77	*4.33 g22.6 *g5.11 *g2.59 *g2.42
Portage River	do	Lat 42°25'40", long 83°57'35", in SW¼ sec.34, T.1 N., R.4 E., Livingston County, at bridge on Tiplady Road, 2.0 miles upstream from Little Portage Lake, and 2.2 miles southwest of Pinckney, MI.	79.1	1944-72a, 1973-77h	10-12-76	*34.4
Portage Lake Outlet	do	Lat 42°25'09", long 83°54'20", in SE¼ NE¼ sec.1, T.1 S., R.4 E., Washtenaw County, at old outlet structure, 1.2 miles northwest of Dover, MI.	-	-	05-04-77	g12.9
do	do	Lat 42°24'55", long 83°54'20", in SE¼ SE¼ sec.1, T.1 S., R.4 E., Washtenaw County, at the DNR Access Site, at bridge on McGregor Road, 1.0 mile northwest of Dover, MI.	-	-	05-04-77	g272
North Fork Mill Creek	Mill Creek	Lat 42°19'19", long 83°58'45", in NE¼ sec.8, T.2 S., R.4 E., Washtenaw County, at Dexter Chelsea Road, 1.5 miles east of Chelsea, MI.	38.2	1944-47, 1961, 1976	10-12-76	*7.34
Fleming Creek	Huron River	Lat 42°16'28", long 83°40'02", in SE¼ sec.25, T.2 S., R.6 E., Washtenaw County, at Geddes Road, 0.5 mile north of Geddes, MI.	30.6	1970-72, 1976	10-12-76	*8.46
Huron River	Lake Erie	Lat 42°11'15", long 83°25'31", in NE¼ sec.36, T.3 S., R.8 E., Wayne County, at Lower Huron Metropolitan Parkway, 1.0 mile northwest of New Boston, MI.	849	1976	10-12-76 04-26-77 08-10-77	*281 2340 299
South Branch River Raisin	River Raisin	Lat 41°50'50", long 84°04'00", in NW¼ sec.28, T.7 S., R.3 E., Lenawee County, at bridge on Bailey Highway, 1.0 mile northeast of Sand Creek, MI.	-	-	08-24-77	*g15.4
do	do	Lat 41°53'21", long 84°02'45", in NE¼ sec.10, T.7 S., R.3 E., Lenawee County, at bridge on State Highway 34, in Adrian, MI.	86.8	1970	08-24-77	*g21.4
Wolf Creek	South Branch River Raisin	Lat 41°55'01", long 84°03'52", in SW¼ sec.27, T.6 S., R.3 E., Lenawee County, at bridge on Tipton Road, 2.0 miles northwest of Adrian, MI.	69.7	1955, 1963-64, 1970	08-24-77	*g9.60
South Branch River Raisin	River Raisin	Lat 41°55'04", long 84°00'35", in SE¼ sec.25, T.6 S., R.3 E., Lenawee County, at bridge on Howell Highway, 2.0 miles northeast of Adrian, MI.	165	1970, 1972	08-24-77	*g33.2
East Fork of the West Branch St. Joseph River	St. Joseph River	Lat 41°42'30", long 84°41'22", in NE¼ sec.7, T.9 S., R.3 W., Hillsdale County, at bridge on Territorial Road, 2.0 miles south of Austin, MI.	50.2	1963, 1967	04-14-77	*g53.0
Bean Creek	Tiffin River	Lat 41°57'51", long 84°20'47", in SE¼ sec.7, T.6 S., R.1 E., Lenawee County, on Manitou Road, 1.5 miles south of Addison, MI.	-	-	08-25-77	*g1.15
do	do	Lat 41°53'00", long 84°21'03", in SW¼ sec.6, T.7 S., R.1 E., Lenawee County, at bridge on Beecher Road, 2.0 miles north of Hudson, MI.	-	1963	08-25-77	*g1.91

* Base flow.
a Operated as a continuous-record gaging station.
b Flow partially regulated.
c Field estimate.
d Approximately.
e Not previously published.
f Operated as a low-flow partial-record station.
g Discharge measurement made by employees of Michigan Department of Natural Resources.
h Operated as a crest-stage partial-record station.

FLINT RIVER BASIN LOW-FLOW INVESTIGATION

On Aug. 19, 1977 a series of discharge measurements were made at selected locations in the Flint River basin as part of a water-resources investigation carried on in cooperation with the Michigan Department of Natural Resources. The data collected in this series of measurements, along with data already collected and to be collected in the future, will provide the basis for determining the base-flow yields of various parts of the basin. The measurements are believed to be unaffected by surface runoff due to antecedent precipitation, and thus represent base flow.

The drainage areas shown were determined from U.S. Geological Survey topographic maps having scales of 1:24,000 or 1:62,500 and a contour interval of 10 or 20 feet.

Stream	Location	Drainage area (mi^2)	Discharge (ft^3/s)	Cfs per square mile
Cedar Creek	Lat 43°11'15", long 83°08'08", in NW¼ sec.23, T.9 N., R.11 E., Lapeer County, at bridge on Slattery Road, 3.7 miles southeast of North Branch, MI.	a15	b0	0
Indian Creek	Lat 43°15'35", long 83°13'33", in NE¼ sec.30, T.10 N., R.11 E., Lapeer County, at bridge on Law Road, 4.5 miles southwest of Clifford, MI.	a30	b.20	.007
North Branch Flint River	Lat 43°11'18", long 83°22'03", in NW¼ sec.24, T.9 N., R.9 E., Lapeer County, 300 ft below Barnes Lake Road, 2.8 miles northeast of Columbiaville, MI.	223	b22.4	.100
South Branch Flint River	Lat 42°56'36", long 83°13'32", in SE¼ sec.12, T.6 N., R.10 E., Lapeer County, at bridge on Dryden Road, in Thornville, MI.	45.9	b4.57	.100
do[c/]	Lat 43°02'35", long 83°17'04", in NW¼ sec.10, T.7 N., R.10 E., Lapeer County, at bridge on Morris Road, 0.2 mile south of State Highway 21 and 1.5 miles southeast of Lapeer, MI.	77.9	b8.62	.111
do[cd/]	Lat 43°04'44", long 83°18'25", in SE¼ sec.29, T.8 N., R.10 E., Lapeer County, at bridge on Saginaw Road, 1.6 miles north of Lapeer, MI.	160	b16.7	.104
Plum Creek Drain	Lat 43°05'48", long 83°19'40", in NW¼ sec.20, T.8 N., R.10 E., Lapeer County, at bridge on Valentine Road, 2.5 miles northwest of Lapeer, MI.	a36	b0	0
Hemingway and Whipple Drain	Lat 43°10'52", long 83°24'08", in NW¼ sec.22, T.9 N., R.9 E., Lapeer County, at bridge on Hollenbeck Road, 1.7 miles northeast of Columbiaville, MI.	a7.7	b.23	.030
Henry Drain	Lat 43°07'40", long 83°24'38", in SE¼ sec.4, T.8 N., R.9 E., Lapeer County, at bridge on Mt. Morris Road, 2.0 miles south of Columbiaville, MI.	a13	b1.00	.077
Hasler Creek	Lat 43°05'36", long 83°27'34", in NE¼ sec.24, T.8 N., R.8 E., Genesee County, at bridge on Coldwater Road, 3.0 miles east of Richfield Center, MI.	28.3	b1.47	.052
Flint River	Gaging station near Otisville, MI (04147500).	531	b57.7	.109
Butternut Creek	Gaging station near Genesee, MI (04147990).	34.5	b2.88	.083
Flint River	Lat 43°04'34", long 83°39'17", in SW¼ sec.21, T.8 N., R.7 E., Genesee County, at bridge on Carpenter Road, 2.0 miles east of Flint, MI.	614	e	
Black Creek	Lat 43°01'37", long 83°32'15", in NE¼ sec.8, T.7 N., R.8 E., Genesee County, at bridge on Gale Road, 1.0 mile west of Davison, MI.	a21	.54	.026
Kearsley Creek	Gaging station near Davison, MI (04148140).	99.6	6.66	.067
do	Lat 43°03'22", long 83°39'25", in NE¼ sec.32, T.8 N., R.7 E., Genesee County, at outlet of Kearsley Reservoir, in Flint, MI.	115	9.66	.084
Gilkey Creek	Gaging station near Flint, MI (04148160).	6.29	0	0
Swartz Creek	Gaging station at Flint, MI (04148300).	115	f.32	.003
Thread Creek	Gaging station near Flint, MI (04148440).	55.6	2.11	.038
Flint River	Gaging station near Flint, MI (04148500).	954	109	.114
Pirnie Creek	Lat 43°01'54", long 83°47'13", in SW¼ sec.5, T.7 N., R.6 E., Genesee County, at bridge on Beecher Road, 2.7 miles southeast of Flushing, MI.	3.72	.08	.022
Mud Creek	Lat 43°02'54", long 83°49'57", in SW¼ sec.36, T.8 N., R.5 E., Genesee County, at culvert on Morrish Road, 0.5 mile southeast of Flushing, MI.	a8.3	.03	.004

See footnotes at end of the table

DISCHARGE MEASUREMENTS MADE IN THE FLINT RIVER BASIN, AUG. 19, 1977--Continued

Stream	Location	Drainage area (mi^2)	Discharge (ft^3/s)	Cfs per square mile
Cole Creek[d/]	Lat 43°02'44", long 83°51'06", in SW¼ sec. 35, T.8 N., R.5 E., Genesee County, at bridge on Potter Road, 1.2 miles south of Flushing, MI.	8.51	0.07	0.008
Freeman Drain[d/]	Lat 43°07'04", long 83°53'37", in SE¼ sec.5, T.8 N., R.5 E., Genesee County, at bridge on Mt. Morris Road, 4.0 miles south of Montrose, MI.	8.21	.16	.019
Armstrong Creek	Lat 43°09'33", long 83°51'49", in NW¼ sec.27, T.9 N., R.5 E., Genesee County, at bridge on McKinley Road, 2.2 miles southeast of Montrose, MI.	13.3	.50	.038
Flint River	Lat 43°10'34", long 83°52'42", in SE¼ sec.16, T.9 N., R.5 E., Genesee County, at bridge on State Highway 57, 0.7 mile east of Montrose, MI.	1034	101	.098
Brent Run	Gaging station near Montrose, MI (04148720).	18.3	4.58	.250
Flint River	Gaging station near Fosters, MI (04149000).	1189	f150	.126

a Approximately.
b Discharge measurement made by employees of Michigan Department of Natural Resources.
c At site of low-flow partial-record station.
d At site of crest-stage partial-record station.
e No measurable flow; no flow over Mott Reservoir Dam ½ mile upstream.
f Daily mean discharge.

Water-quality partial-record stations are particular sites where chemical-quality, biological and or sediment data are collected systematically over a period of years for use in hydrologic analyses. The data are collected usually less than quarterly.

STREAMS TRIBUTARY TO LAKE MICHIGAN

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)
04096209 - BAW BEESE LK OUT AT GRSWLD RD AT HILLSDALE, MICH (LAT 41 54 23 LONG 084 37 21.01)											
FEB , 1977											
14...	1535	.75	435	7.8	2.0	5	11.7	200	40	47	19
04096210 - KING LK INLET AT CAMBRIA RD AT HILLSDALE, MICH.. (LAT 41 53 48 LONG 084 39 04.01)											
FEB , 1977											
14...	1345	.70	540	7.1	1.0	20	14.7	280	75	78	21
04096212 - KING LAKE OUTLET AT M-99 AT HILLSDALE, MICH. . (LAT 41 54 01 LONG 084 37 55.01)											
FEB , 1977											
14...	1445	2.0	570	7.5	1.0	25	13.2	290	83	78	23
04096217 - ST. JOSEPH RIVER AT SOUTH ST AT HILLSDALE, MICH. (LAT 41 54 58 LONG 084 37 32.01)											
FEB , 1977											
14...	1615	3.8	720	7.9	.5	20	12.5	260	48	68	21
04096245 - BEEHE CREEK AT KNOWLES RD NR NORTH ADAMS, MICH.. (LAT 41 56 38 LONG 084 31 32.01)											
FEB , 1977											
15...	1455	--	585	7.4	1.5	7	11.8	320	97	89	23
04096257 - BEEHE CREEK AT MILNES RD NEAR HILLSDALE, MICH. . (LAT 41 57 44 LONG 084 35 35.01)											
FEB , 1977											
16...	1145	6.0	680	7.2	.0	10	9.8	350	74	92	29
04096260 - BEEBE C TRIB AT BARKER RD NR NORTH ADAMS, MICH.. (LAT 41 59 02 LONG 084 33 53.01)											
FEB , 1977											
15...	1400	.90	565	7.2	1.0	17	13.0	250	71	70	19
04096262 - BEEBE C TRIB AT MILNES RD NEAR HILLSDALE, MICH.. (LAT 41 58 08 LONG 084 35 35.01)											
FEB , 1977											
16...	1045	.14	750	7.0	.0	15	12.7	360	110	99	28
04096265 - HALF MOON LK OUT,N ADAMS RD,NR JONESVILLE, MICH. (LAT 41 58 38 LONG 084 36 40.01)											
FEB , 1977											
15...	0950	.20	485	7.6	.5	5	9.8	260	33	67	23
04096282 - ST. JOSEPH R AT STERLING RD NR LITCHFIELD, MICH. (LAT 42 00 54 LONG 084 43 16.01)											
FEB , 1977											
18...	1100	10	760	7.5	.0	5	8.2	340	78	91	27

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	DIS-SOLVED SODIUM (NA) (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	DIS-SOLVED PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)	ALKA-LINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DIS-SOLVED SULFATE (SO4) (MG/L)	DIS-SOLVED CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)
04096209 - BAW BEESE LK OUT AT GRSWLD RD AT HILLSDALE, MICH (LAT 41 54 23 LONG 084 37 21.01)											
FEB , 1977 14...	12	12	.4	1.8	190	0	156	4.8	22	22	.1
04096210 - KING LK INLET AT CAMBRIA RD AT HILLSDALE, MICH.. (LAT 41 53 48 LONG 084 39 04.01)											
FEB , 1977 14...	7.5	5	.2	3.8	252	0	207	32	55	19	.1
04096212 - KING LAKE OUTLET AT M-99 AT HILLSDALE, MICH. . (LAT 41 54 01 LONG 084 37 55.01)											
FEB , 1977 14...	8.6	6	.2	5.3	252	0	207	13	45	19	.1
04096217 - ST. JOSEPH RIVER AT SOUTH ST AT HILLSDALE, MICH. (LAT 41 54 58 LONG 084 37 32.01)											
FEB , 1977 14...	49	29	1.3	3.7	254	0	208	5.1	36	88	.2
04096245 - BEEBE CREEK AT KNOWLES RD NR NORTH ADAMS, MICH.. (LAT 41 56 38 LONG 084 31 32.01)											
FEB , 1977 15...	6.8	4	.2	1.8	268	0	220	17	58	21	.2
04096257 - BEEBE CREEK AT MILNES RD NEAR HILLSDALE, MICH. . (LAT 41 57 44 LONG 084 35 35.01)											
FEB , 1977 16...	9.9	6	.2	2.0	335	0	275	34	49	22	.2
04096260 - BEEBE C TRIB AT BARKER RD NR NORTH ADAMS, MICH.. (LAT 41 59 02 LONG 084 33 53.01)											
FEB , 1977 15...	16	12	.4	4.8	222	0	182	22	39	44	.1
04096262 - BEEBE C TRIB AT MILNES RD NEAR HILLSDALE, MICH.. (LAT 41 58 08 LONG 084 35 35.01)											
FEB , 1977 16...	19	10	.4	3.1	306	0	251	49	56	66	.2
04096265 - HALF MOON LK OUT,N ADAMS RD,NR JONESVILLE, MICH. (LAT 41 58 38 LONG 084 36 40.01)											
FEB , 1977 15...	4.8	4	.1	1.6	279	0	229	11	25	8.7	.2
04096282 - ST. JOSEPH R AT STERLING RD NR LITCHFIELD, MICH. (LAT 42 00 54 LONG 084 43 16.01)											
FEB , 1977 18...	33	17	.8	2.9	318	0	261	16	47	62	.3

DATE	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER AC-FT)	DIS-SOLVED SOLIDS (TONS PER DAY)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ORTHO PHOS-PHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CAD-MIUM (CD) (UG/L)	TOTAL CHRO-MIUM (CR) (UG/L)
04096209 - BAW BEESE LK OUT AT GRSWLD RD AT HILLSDALE, MICH (LAT 41 54 23 LONG 084 37 21.01)											
FEB , 1977 14...	4.8	243	222	.33	.48	.10	.08	.08	1	0	<10
04096210 - KING LK INLET AT CAMBRIA RD AT HILLSDALE, MICH.. (LAT 41 53 48 LONG 084 39 04.01)											
FEB , 1977 14...	8.3	346	327	.47	.65	2.0	.01	.03	1	0	<10
04096212 - KING LAKE OUTLET AT M-99 AT HILLSDALE, MICH. . (LAT 41 54 01 LONG 084 37 55.01)											
FEB , 1977 14...	7.2	403	318	.55	2.18	1.6	.02	.06	2	0	<10
04096217 - ST. JOSEPH RIVER AT SOUTH ST AT HILLSDALE, MICH. (LAT 41 54 58 LONG 084 37 32.01)											
FEB , 1977 14...	6.5	427	402	.58	4.38	.93	.03	.09	1	0	<10
04096245 - BEEME CREEK AT KNOWLES RD NR NORTH ADAMS, MICH.. (LAT 41 56 38 LONG 084 31 32.01)											
FEB , 1977 15...	10	389	345	.50	--	.63	.02	.06	0	1	<10
04096257 - BEEME CREEK AT HILNES RD NEAR HILLSDALE, MICH. . (LAT 41 57 44 LONG 084 35 35.01)											
FEB , 1977 16...	9.9	401	381	.55	6.50	.42	.01	.03	1	0	<10
04096260 - BEEME C TRIB AT BARKER RD NR NORTH ADAMS, MICH.. (LAT 41 59 02 LONG 084 33 53.01)											
FEB , 1977 15...	10	345	318	.47	.84	1.2	.03	.09	1	0	<10
04096262 - BEERE C TRIB AT HILAES RD NEAR HILLSDALE, MICH.. (LAT 41 58 08 LONG 084 35 35.01)											
FEB , 1977 16...	10	486	437	.63	.18	1.1	.02	.06	1	0	<10
04096265 - HALF MOON LK OUT,N ADAMS RD,NR JONESVILLE, MICH. (LAT 41 58 38 LONG 084 36 40.01)											
FEB , 1977 15...	11	301	281	.41	.16	.56	.01	.03	1	0	<10
04096282 - ST. JOSEPH R AT STERLING RD NR LITCHFIELD, MICH. (LAT 42 00 54 LONG 084 43 16.01)											
FEB , 1977 18...	9.8	458	439	.61	12.2	1.9	.27	.83	0	0	<10

DATE	TOTAL COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DIS-SOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELE-NIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)	CYANIDE (CN) (MG/L)
04096209 - BAW BEESE LK OUT AT GRSWLD RD AT HILLSDALE, MICH (LAT 41 54 23 LONG 084 37 21.01)											
FEB , 1977 14...	0	10	50	1	40	<.5	0	0	0	10	--
04096210 - KING LK INLET AT CAMBRIA RD AT HILLSDALE, MICH.. (LAT 41 53 48 LONG 084 39 04.01)											
FEB , 1977 14...	0	10	680	3	220	<.5	0	1	0	10	--
04096212 - KING LAKE OUTLET AT M-99 AT HILLSDALE, MICH. . (LAT 41 54 01 LONG 084 37 55.01)											
FEB , 1977 14...	0	0	160	3	200	<.5	1	1	0	10	--
04096217 - ST. JOSEPH RIVER AT SOUTH ST AT HILLSDALE, MICH. (LAT 41 54 58 LONG 084 37 32.01)											
FEB , 1977 14...	0	10	130	9	120	<.5	1	0	0	30	--
04096245 - BEEBE CREEK AT KNOWLES RD NR NORTH ADAMS, MICH.. (LAT 41 56 38 LONG 084 31 32.01)											
FEB , 1977 15...	0	10	60	2	90	<.5	1	0	0	20	--
04096257 - BEEBE CREEK AT MILNES RD NEAR HILLSDALE, MICH. . (LAT 41 57 44 LONG 084 35 35.01)											
FEB , 1977 16...	0	10	50	2	150	<.5	2	0	0	10	--
04096260 - BEEBE C TRIB AT BARKER RD NR NORTH ADAMS, MICH.. (LAT 41 59 02 LONG 084 33 53.01)											
FEB , 1977 15...	0	10	250	4	230	<.5	1	0	0	10	--
04096262 - BEEBE C TRIB AT MILNES RD NEAR HILLSDALE, MICH.. (LAT 41 58 08 LONG 084 35 35.01)											
FEB , 1977 16...	1	20	170	3	110	<.5	2	0	0	20	--
04096265 - HALF MOON LK OUT,N ADAMS RD,NR JONESVILLE, MICH. (LAT 41 58 38 LONG 084 36 40.01)											
FEB , 1977 15...	1	10	10	2	20	<.5	1	0	0	20	--
04096282 - ST. JOSEPH R AT STERLING RD NR LITCHFIELD, MICH. (LAT 42 00 54 LONG 084 43 16.01)											
FEB , 1977 18...	0	20	50	1	100	<.5	29	0	0	20	--

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	DISSOLVED OXYGEN (MG/L)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)
04096285 - ST. JOSEPH R AT MILL POND AT LITCHFIELD, MICH. (LAT 42 01 58 LONG 084 44 13.01)											
FEB 17...	1430	10	740	7.4	.0	7	9.0	320	65	86	26
04096293 - S SAND LK OUTLET AT BACON RD NR HILLSDALE, MICH. (LAT 41 55 52 LONG 084 41 56.01)											
DEC 23...	1100	--	429	8.1	2.0	11	14.7	230	41	58	20
04096298 - SAND C TRIB BELOW MECHANIC RD NR HILLSDALE, MICH (LAT 41 55 58 LONG 084 41 42.01)											
DEC 23...	1230	--	563	8.0	.5	16	13.7	380	55	81	24
04096299 - M SAND LK OUT AT MECHANIC RD NR HILLSDALE, MICH. (LAT 41 56 34 LONG 084 42 06.01)											
DEC 23...	1145	--	467	7.7	1.0	10	11.2	250	50	66	21
04096304 - SAND CREEK AT US-12 NEAR ALLEN, MICH. (LAT 41 57 47 LONG 084 44 20.01)											
FEB 16...	1330	7.2	500	7.5	.5	2	10.7	260	38	67	22
04096307 - SAND C TRIBUTARY AT BEULOW RD NEAR ALLEN, MICH.. (LAT 41 58 51 LONG 084 44 20.01)											
FEB 16...	1430	.50	490	7.6	.0	5	12.2	250	53	70	19
04096308 - SAND CREEK AT JONESVILLE RD NR ALLEN, MICH. (LAT 41 59 08 LONG 084 45 04.01)											
FEB 16...	1510	7.0	485	7.6	1.0	5	11.0	270	41	70	22
04096317 - ST. JOSEPH R AT S CO LINE RD NR LITCHFIELD, MICH (LAT 42 04 21 LONG 084 49 58.01)											
FEB 17...	1325	35	720	7.4	.0	5	9.3	310	66	83	25
04096332 - ST. JOSEPH R AT T DRIVE SOUTH NEAR HOMER, MICH.. (LAT 42 06 04 LONG 084 50 38.01)											
FEB 17...	1210	37	670	7.2	.0	5	9.7	310	64	82	25

DATE	DIS-SOLVED SODIUM (NA) (MG/L)	PERCENT SODIUM	SODIUM AD-SORP-TION RATIO	DIS-SOLVED PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO3) (MG/L)	CAR-BONATE (CO3) (MG/L)	ALKA-LINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DIS-SOLVED SULFATE (SO4) (MG/L)	DIS-SOLVED CHLO-RIDE (CL) (MG/L)	DIS-SOLVED FLUO-RIDE (F) (MG/L)
04096285 - ST. JOSEPH R AT MILL POND AT LITCHFIELD, MICH. (LAT 42 01 58 LONG 084 44 13.01)											
FEB , 1977 17...	37	20	.9	3.1	313	0	257	20	47	68	.2
04096293 - S SAND LK OUTLET AT BACON RD NR HILLSDALE, MICH. (LAT 41 55 52 LONG 084 41 56.01)											
DEC , 1976 23...	5.9	5	.2	1.4	227	0	186	2.9	30	14	.2
04096298 - SAND C TRIB BELOW MECHANIC RD NR HILLSDALE, MICH (LAT 41 55 58 LONG 084 41 42.01)											
DEC , 1976 23...	3.5	2	.1	.9	300	0	246	4.8	35	12	.1
04096299 - M SAND LK OUT AT MECHANIC RD NR HILLSDALE, MICH. (LAT 41 56 34 LONG 084 42 06.01)											
DEC , 1976 23...	5.4	4	.1	1.4	245	0	201	7.8	31	12	.1
04096304 - SAND CREEK AT US-12 NEAR ALLEN, MICH. (LAT 41 57 47 LONG 084 44 20.01)											
FEB , 1977 16...	5.6	4	.2	1.2	268	0	220	14	35	10	.1
04096307 - SAND C TRIBUTARY AT BEULOW RD NEAR ALLEN, MICH.. (LAT 41 58 51 LONG 084 44 20.01)											
FEB , 1977 16...	3.2	3	.1	1.9	244	0	200	9.8	42	8.3	.1
04096308 - SAND CREEK AT JONESVILLE RD NR ALLEN, MICH. (LAT 41 59 08 LONG 084 45 04.01)											
FEB , 1977 16...	5.9	5	.2	1.3	274	0	225	11	38	12	.1
04096317 - ST. JOSEPH R AT S CO LINE RD NR LITCHFIELD, MICH (LAT 42 04 21 LONG 084 49 50.01)											
FEB , 1977 17...	31	18	.8	2.4	298	0	244	19	51	57	.2
04096332 - ST. JOSEPH R AT T DRIVE SOUTH NEAR HOMER, MICH.. (LAT 42 06 04 LONG 084 50 38.01)											
FEB , 1977 17...	26	15	.6	2.3	297	0	244	30	52	46	.1

DATE	DIS-SOLVED SILICA (SIO2) (MG/L)	DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L)	DIS-SOLVED SOLIDS (TONS PER AC-FT)	DIS-SOLVED SOLIDS (TONS PER DAY)	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L)	DIS-SOLVED ORTHO PHOS-PHATE (PO4) (MG/L)	TOTAL ARSENIC (AS) (UG/L)	TOTAL CAD-MIUM (CD) (UG/L)	TOTAL CHRO-MIUM (CR) (UG/L)
04096285 - ST. JOSEPH R AT MILL POND AT LITCHFIELD, MICH. (LAT 42 01 58 LONG 084 44 13.01)											
FEB , 1977 17...	9.5	455	441	.62	12.3	2.1	.23	.71	2	0	<10
04096293 - S SAND LK OUTLET AT BACON RD NR HILLSDALE, MICH. (LAT 41 55 52 LONG 084 41 56.01)											
DEC , 1976 23...	8.3	247	250	.34	--	.10	.01	.03	0	0	<10
04096298 - SAND C TRIB BELOW MECHANIC RD NR HILLSDALE, MICH (LAT 41 55 58 LONG 084 41 42.01)											
DEC , 1976 23...	9.6	330	327	.45	--	2.9	.01	.03	0	0	<10
04096299 - M SAND LK OUT AT MECHANIC RD NR HILLSDALE, MICH. (LAT 41 56 34 LONG 084 42 06.01)											
DEC , 1976 23...	8.9	270	269	.37	--	.62	.01	.03	0	0	<10
04096304 - SAND CREEK AT US-12 NEAR ALLEN, MICH. (LAT 41 57 47 LONG 084 44 20.01)											
FEB , 1977 16...	9.0	297	282	.40	5.77	--	--	--	0	0	<10
04096307 - SAND C TRIBUTARY AT BEULOW RD NEAR ALLEN, MICH.. (LAT 41 58 51 LONG 084 44 20.01)											
FEB , 1977 16...	8.3	307	289	.42	.41	3.6	.01	.03	1	0	<10
04096308 - SAND CREEK AT JONESVILLE RD NR ALLEN, MICH. (LAT 41 59 08 LONG 084 45 04.01)											
FEB , 1977 16...	9.3	309	301	.42	5.84	1.6	.01	.03	1	0	<10
04096317 - ST. JOSEPH R AT S CO LINE RD NR LITCHFIELD, MICH (LAT 42 04 21 LONG 084 49 50.01)											
FEB , 1977 17...	9.5	430	415	.58	40.6	1.9	.16	.49	0	0	<10
04096332 - ST. JOSEPH R AT T DRIVE SOUTH NEAR HOMER, MICH.. (LAT 42 06 04 LONG 084 50 38.01)											
FEB , 1977 17...	9.5	408	397	.55	40.8	1.6	.09	.28	1	0	<10

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TOTAL COBALT (CO) (UG/L)	TOTAL COPPER (CU) (UG/L)	DIS-SOLVED IRON (FE) (UG/L)	TOTAL LEAD (PB) (UG/L)	DIS-SOLVED MAN-GANESE (MN) (UG/L)	TOTAL MERCURY (HG) (UG/L)	TOTAL NICKEL (NI) (UG/L)	TOTAL SELE-NIUM (SE) (UG/L)	TOTAL SILVER (AG) (UG/L)	TOTAL ZINC (ZN) (UG/L)	CYANIDE (CN) (MG/L)
04096285 - ST. JOSEPH R AT MILL POND AT LITCHFIELD, MICH. (LAT 42 01 58 LONG 084 44 13.01)											
FEB , 1977 17...	0	30	40	3	100	<.5	17	0	0	20	--
04096293 - S SAND LK OUTLET AT BACON RD NR HILLSDALE, MICH. (LAT 41 55 52 LONG 084 41 56.01)											
DEC , 1976 23...	0	0	0	2	0	<.5	2	0	0	10	.00
04096298 - SAND C TRIB BELOW MECHANIC RD NR HILLSDALE, MICH (LAT 41 55 58 LONG 084 41 42.01)											
DEC , 1976 23...	1	0	30	1	60	<.5	2	0	0	10	.00
04096299 - M SAND LK OUT AT MECHANIC RD NR HILLSDALE, MICH. (LAT 41 56 34 LONG 084 42 06.01)											
DEC , 1976 23...	0	0	20	3	30	<.5	1	0	0	10	.00
04096304 - SAND CREEK AT US-12 NEAR ALLEN, MICH. (LAT 41 57 47 LONG 084 44 20.01)											
FEB , 1977 16...	0	10	10	0	10	<.5	1	0	0	10	--
04096307 - SAND C TRIBUTARY AT BEULOW RD NEAR ALLEN, MICH.. (LAT 41 58 51 LONG 084 44 20.01)											
FEB , 1977 16...	0	10	50	1	40	.8	2	0	0	10	--
04096308 - SAND CREEK AT JONESVILLE RD NR ALLEN, MICH. (LAT 41 59 08 LONG 084 45 04.01)											
FEB , 1977 16...	1	10	50	4	40	.6	1	0	0	0	--
04096317 - ST. JOSEPH R AT S CO LINE RD NR LITCHFIELD, MICH (LAT 42 04 21 LONG 084 49 50.01)											
FEB , 1977 17...	1	20	60	3	60	.5	2	0	0	0	--
04096332 - ST. JOSEPH R AT T DRIVE SOUTH NEAR HOMER, MICH.. (LAT 42 06 04 LONG 084 50 38.01)											
FEB , 1977 17...	0	10	20	3	70	<.5	5	0	0	10	--

ANALYSES OF SAMPLES COLLECTED AT WATER-QUALITY PARTIAL-RECORD STATIONS

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977--CONTINUED

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)
04096217 - ST. JOSEPH RIVER AT SOUTH ST AT HILLSDALE, MICH. (LAT 41 54 58 LONG 084 37 32.01)								
APR , 1977								
18...	0900	16	425	8.0	16.0	11.0	.24	.01
04096227 - ST. JOSEPH RIVER BELOW STP AT HILLSDALE, MICH. . (LAT 41 56 04 LONG 084 38 26.01)								
APR , 1977								
18...	1020	--	695	7.8	15.0	10.9	.77	.06
04096278 - ST. JOSEPH R BELOW STP AT JONESVILLE, MICH. . (LAT 41 59 37 LONG 084 40 20.01)								
APR , 1977								
18...	1300	--	580	7.9	17.5	10.3	.91	.07
04096282 - ST. JOSEPH R AT STERLING RD NR LITCHFIELD, MICH. (LAT 42 00 54 LONG 084 43 16.01)								
APR , 1977								
18...	1345	--	570	8.0	18.5	10.5	1.2	.06
04096285 - ST. JOSEPH R AT MILL POND AT LITCHFIELD, MICH. . (LAT 42 01 58 LONG 084 44 13.01)								
APR , 1977								
18...	1420	--	575	7.9	18.5	10.2	1.0	.06

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)
04096217 - ST. JOSEPH RIVER AT SOUTH ST AT HILLSDALE, MICH. (LAT 41 54 58 LONG 084 37 32.01)								
APR , 1977								
18...	.25	.10	.70	.80	1.1	4.6	.03	.01
04096227 - ST. JOSEPH RIVER BELOW STP AT HILLSDALE, MICH. . (LAT 41 56 04 LONG 084 38 26.01)								
APR , 1977								
18...	.83	1.4	1.6	3.0	3.8	17	.68	.47
04096278 - ST. JOSEPH R BELOW STP AT JONESVILLE, MICH. . (LAT 41 59 37 LONG 084 40 20.01)								
APR , 1977								
18...	.98	.23	1.2	1.4	2.4	11	.19	.09
04096282 - ST. JOSEPH R AT STERLING RD NR LITCHFIELD, MICH. (LAT 42 00 54 LONG 084 43 16.01)								
APR , 1977								
18...	1.3	.10	.90	1.0	2.3	10	.21	.09
04096285 - ST. JOSEPH R AT MILL POND AT LITCHFIELD, MICH. . (LAT 42 01 58 LONG 084 44 13.01)								
APR , 1977								
18...	1.1	.08	.92	1.0	2.1	9.3	.19	.06

Samples are collected at sites other than gaging stations and partial-record stations to give better areal coverage in a river basin. Such sites are referred to as miscellaneous sites.

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STREAMS TRIBUTARY TO LAKE SUPERIOR

463025087365001 TEAL LAKE AT NEGAUNEE, MI (LAT 46 30 25 LONG 087 36 50)

DATE	TIME	SAMPLING DEPTH (FT)	DEPTH OF RESERVOIR (FT)	AZIMUTH FROM SOUTHERNMOST POINT (DEG)	DISTANCE FROM SOUTHERNMOST POINT (FT)	STAGE (FT ABOVE DATUM)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	AIR TEMPERATURE (DEG C)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	TRANSPARENCY (SECCHI DISK) (IN)
JUN 09...	1030	3.0	30	.0	1680	3.52	125	7.3	14.5	17.5	0	260

DATE	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	PERCENT SODIUM	SODIUM ADSORPTION RATIO	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)
JUN 09...	48	16	13	3.8	4.5	17	.3	.6	39	0	32	3.1

DATE	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	DISSOLVED SOLIDS (TONS PER AC-FT)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)
JUN 09...	11	8.7	.0	7.7	80	69	.11	.01	.00	.01	.02	.29

DATE	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED IRON (FE) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL ORGANIC CARBON (C) (MG/L)	TOTAL PHYTOPLANKTON (CELLS PER ML)	CHLOROPHYLL A (UG/L)	CHLOROPHYLL B (UG/L)	POTENTIAL ALGAL GROWTH BOTTLE TEST (MG/L)
JUN 09...	.31	.32	1.4	.02	.00	50	20	2.6	1100	.614	.529	1.2

DATE	TIME	SAMPLING DEPTH (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION
JUN							
09...	1028	1.0	--	--	17.5	8.5	93
09...	1032	5.0	--	--	17.5	8.5	93
09...	1034	10	--	--	17.5	8.5	93
09...	1036	15	130	7.3	17.5	8.5	93
09...	1038	20	--	--	17.5	8.5	93
09...	1040	25	132	6.8	16.5	4.2	45
09...	1042	30	--	--	14.5	.7	7

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STREAMS TRIBUTARY TO LAKE SUPERIOR--CONTINUED

463025087365001 TEAL LAKE AT NEGAUNEE, MI (LAT 46 30 25 LONG 087 36 50)--CONTINUED

PHYTOPLANKTON ANALYSES, OCTOBER 1976 TO JUNE 1977

DATE	JUN 9,77
TIME	1030
TOTAL CELLS/ML	1100
DIVERSITY: DIVISION	1.4
.CLASS	1.7
..ORDER	1.9
...FAMILY	2.0
....GENUS	2.1

ORGANISM	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)		
.CHLOROPHYCEAE		
..CHLOROCOCCALES		
...SCENEDESMACEAE		
....SCENEDESMUS	33	3
CHRYSOPHYTA		
.BACILLARIOPHYCEAE		
..CENTRALES		
...COSCINODISCACEAE		
....CYCLOTELLA	57	5
..PENNALES		
...NAVICULACEAE		
....NAVICULA	24	2
...NITZSCHIACEAE		
....NITZSCHIA	200#	18
.CHRYSOPHYCEAE		
..CHRYSOMONADALES		
...OCHROMONADACEAE		
....DINOBRYON	16	2
....OCHROMONAS	82	8
CYANOPHYTA (BLUE-GREEN ALGAE)		
.CYANOPHYCEAE		
..CHROCCOCCALES		
...CHROCCOCCACEAE		
....ANACYSTIS	580#	55
EUGLENOPHYTA (EUGLENOIDS)		
.EUGLENOPHYCEAE		
..EUGLENALES		
...EUGLENACEAE		
....TRACHELOMONAS	73	7

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STREAMS TRIBUTARY TO LAKE MICHIGAN

04096435 COLDWATER LAKE NEAR COLDWATER, MI (LAT 41 50 29 LONG 084 58 46)

DATE	TIME	DEPTH TO BOTTOM OF SAMPLE INTERVAL (FT)	DEPTH OF RESERVOIR (FT)	DEPTH TO TOP OF SAMPLE INTERVAL (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	TOTAL NITRATE (N) (MG/L)
JUN										
24...	1145	3.5	3.5	.00	453	8.2	23.5	6.4	77	.45

DATE	TOTAL NITRITE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)
JUN									
24...	.02	.47	.09	1.2	1.3	1.8	7.8	.01	.00

414939084583300 COLDWATER LAKE, DEEP SITE, NEAR COLDWATER, MI (LAT 41 49 39 LONG 084 58 33)

DATE	TIME	DEPTH TO BOTTOM OF SAMPLE INTERVAL (FT)	DEPTH OF RESERVOIR (FT)	DEPTH TO TOP OF SAMPLE INTERVAL (FT)	COLOR (PLATINUM-COBALT UNITS)	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UM-MF (COL./ 100 ML)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)
JUN										
29...	0700	15	80	15	5	1800	<1	180	67	43
29...	0705	64	80	64	5	--	--	210	67	53

DATE	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)	DISSOLVED SILICA (SIO2) (MG/L)
JUN										
29...	18	5.0	2.4	140	0	110	47	10	.1	3.0
29...	18	4.9	2.0	170	0	140	46	10	.1	7.3

DATE	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)
JUN									
29...	266	201	--	--	--	.70	.04	.85	.89
29...	302	228	.84	.01	.85	.53	.01	.60	.61

DATE	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	DISSOLVED IRON (FE) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL PHYTOPLANKTON (CELLS PER ML)
JUN									
29...	--	--	.01	.00	.00	.00	80	0	38000
29...	1.5	6.5	.01	.00	.00	.00	20	40	--

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

414939084583300 COLDWATER LAKE, DEEP SITE, NEAR COLDWATER, MI (LAT 41 49 39 LONG 084 58 33)--CONTINUED

DATE	SAMPLING DEPTH (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)
JUN					
28...	5.0	346	8.6	25.5	8.7
28...	10	340	8.6	25.0	9.0
28...	15	360	8.6	22.0	9.0
28...	20	366	8.5	20.0	8.8
28...	25	384	8.3	16.5	8.2
28...	30	396	8.0	13.0	6.4
28...	35	403	7.8	11.0	5.3
28...	40	415	7.8	10.0	5.0
28...	45	426	7.8	9.0	5.0
28...	50	412	7.8	9.0	4.8
28...	55	397	7.8	9.0	4.8
28...	60	402	7.8	8.5	4.8

IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 29,77
TIME	0700
TOTAL CELLS/ML	38000
DIVERSITY: DIVISION	0.5
.CLASS	0.6
..ORDER	1.5
...FAMILY	1.5
....GENUS	1.7

ORGANISM	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)		
.CHLOROPHYCEAE		
..CHLOROCOCCALES		
...SCENEDESMACEAE		
....SCENEDESMUS	270	1
..VOLVOCALES		
...CHLAMYDOMONADACEAE		
....CHLAMYDOMONAS	220	1
CHRYSOPHYTA		
.BACILLARIOPHYCEAE		
..CENTRALES		
...COSCINODISCACEAE		
....CYCLOTELLA	310	1
..PENNALES		
...ACHNANTHACEAE		
....ACHNANTHES	*	0
...DIATOMACEAE		
....DIATOMA	*	0
...NAVICULACEAE		
....NAVICULA	*	0
.CHRYSOPHYCEAE		
..CHRYSOMONADALES		
...OCHROMONADACEAE		
....DINOBRYON	490	1
....OCHROMONAS	720	2
CYANOPHYTA (BLUE-GREEN ALGAE)		
.CYANOPHYCEAE		
..CHROCCOCCALES		
...CHROCCOCCACEAE		
....ANACYSTIS	17000#	45
..HORMOGONALES		
...OSCILLATORIACEAE		
....LYNGBYA	17000#	45
....OSCILLATORIA	670	2
EUGLENOPHYTA (EUGLENOIDS)		
.CRYPTOPHYCEAE		
..CRYPTOMONIDALES		
...CRYPTOCHRYSIDACEAE		
....CHROOMONAS	760	2
PYRRHOPHYTA (FIRE ALGAE)		
.DINOPHYCEAE		
..PERIDINIALES		
...GLENODINIACEAE		
....GLENODINIUM	*	0

- DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

04096440 COLDWATER RIVER (COLDWATER LAKE OUTLET) NEAR KINDERHOOK, MI (LAT 41 50 23 LONG 084 00 03)

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)
JUN 29...	0830	E4.0	354	8.0	24.5	7.4	90	.01	.00

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)
JUN 29...	.01	.02	.70	.72	.73	3.2	.02	.00

04096460 COLDWATER RIVER AT GARFIELD ROAD, NEAR COLDWATER, MI (LAT 41 55 37 LONG 085 02 58)

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)
JUN 29...	1030	E48	402	7.8	23.5	7.0	81	.25	.01

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)
JUN 29...	.26	.03	.66	.69	.95	4.2	.01	.00

04096501 SAUK RIVER NEAR MOUTH AT COLDWATER, MI (LAT 41 56 27 LONG 085 01 34)

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)
JUN 29...	1100	E22	825	7.5	20.0	5.8	71	.10	.19

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)
JUN 29...	.29	9.6	1.4	11	11	50	.13	.04

E--ESTIMATED VALUE

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

04096512 COLD (MUD) CREEK AT COLDWATER, MI (LAT 41 57 50 LONG 085 01 06)

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)
JUN 29...	1200	.00	693	7.7	13.0	6.9	70	1.5	.04

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)
JUN 29...	1.5	.05	.40	.45	2.0	8.6	.02	.00

415830085015900 RANDALL LAKE, DEEP SITE, AT COLDWATER, MI (LAT 41 58 30 LONG 085 01 59)

DATE	TIME	DEPTH TO BOTTOM OF SAMPLE INTERVAL (FT)	DEPTH OF RESERVOIR (FT)	DEPTH TO TOP OF SAMPLE INTERVAL (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	TRANSPARENCY (SECCHI DISK) (IN)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)
JUN 23...	1245	5.0	29	5.0	494	8.6	23.0	5	36	11.2	133	7200
23...	1300	25	29	25	539	7.5	11.0	40	--	.0	0	--

DATE	FECAL COLIFORM .7UM-MF (COL./100 ML)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)
JUN 23...	83	240	89	68	21	16	2.4	180	0	150	.7
23...	--	260	61	72	19	13	2.9	240	0	200	12

DATE	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)
JUN 23...	65	31	.1	.6	347	285	.01	.00	.01	.07	.20
23...	44	27	.1	13	374	312	.00	.00	.00	.01	3.4

DATE	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	DISSOLVED IRON (FE) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)	TOTAL PHYTOPLANKTON (CELLS PER ML)
JUN 23...	.79	.99	1.0	4.4	.04	.00	.00	.00	30	10	120000
23...	1.0	4.4	4.4	19	.49	--	.48	1.5	110	1100	--

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

415830085015900 RANDALL LAKE, DEEP SITE, AT COLDWATER, MI (LAT 41 58 30 LONG 085 01 59)--CONTINUED

IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 23,77
TIME	1245
TOTAL CELLS/ML	120000
DIVERSITY: DIVISION	1.1
.CLASS	1.1
..ORDER	1.5
...FAMILY	1.9
....GENUS	2.1

ORGANISM	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)		
.CHLOROPHYCEAE		
..CHLOROCOCCALES		
...CHARACIACEAE		
....SCHROEDERIA	*	0
...MICRACTINIACEAE		
....GOLENKINIA	1000	1
....MICRACTINIUM	920	1
...OOCYSTACEAE		
....ANKISTRODESMUS	*	0
....DICTYOSPHAERIUM	62000#	51
....KIRCHNERIELLA	*	0
...SCENEDESMACEAE		
....SCENEDESMUS	770	1
..VOLVOCALES		
...CHLAMYDOMONADACEAE		
....CHLAMYDOMONAS	770	1
...VOLVOCACEAE		
....GONIUM	5800	5
CHRYSOPHYTA		
.BACILLARIOPHYCEAE		
..PENNALES		
...FRAGILARIACEAE		
....SYNEDRA	*	0
...NITZSCHIACEAE		
....NITZSCHIA	*	0
...TABELLARIACEAE		
....TABELLARIA	*	0
.CHRYSOPHYCEAE		
..CHRYSOMONADALES		
...OCHROMONADACEAE		
....DINOBRYON	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)		
.CYANOPHYCEAE		
..CHROCCOCCALES		
...CHROCCOCCACEAE		
....ANACYSTIS	2600	2
..HORMOGONALES		
...NOSTOCACEAE		
....ANABAENA	1500	1
....APHANIZOMENON	34000#	28
...OSCILLATORIACEAE		
....LYNGBYA	8900	7
....OSCILLATORIA	1200	1
EUGLENOPHYTA (EUGLENOIDS)		
.EUGLENOPHYCEAE		
..EUGLENALES		
...EUGLENACEAE		
....TRACHELOMONAS	690	1

- DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

415830085015900 RANDALL LAKE, DEEP SITE, AT COLDWATER, MI (LAT 41 58 30 LONG 085 01 59)--CONTINUED

DATE	SAMPLING DEPTH (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)
JUN					
23...	2.0	489	8.6	23.0	11.2
23...	4.0	489	8.6	23.0	11.2
23...	6.0	499	8.6	23.0	11.2
23...	8.0	489	8.6	23.0	11.2
23...	10	489	8.6	23.0	11.2
23...	12	508	8.0	21.5	5.6
23...	14	536	7.6	19.0	.9
23...	16	529	7.6	18.5	.4
23...	18	534	7.6	18.0	.2
23...	20	538	7.6	16.0	.0
23...	22	538	7.6	14.0	.0
23...	24	540	7.4	12.0	.0
23...	26	572	7.2	10.0	.0
23...	28	572	7.2	10.0	.0

415913085014300 MORRISON LAKE, DEEP SITE, AT COLDWATER, MI (LAT 41 59 13 LONG 085 01 43)

DATE	SAMPLING DEPTH (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)
JUN					
23...	2.0	484	8.6	23.5	9.2
23...	4.0	484	8.6	23.5	9.0
23...	6.0	489	8.5	23.0	8.8
23...	8.0	483	8.5	22.5	7.8
23...	10	488	8.2	22.0	7.6
23...	12	497	8.4	21.5	7.4
23...	14	501	8.3	21.0	6.8
23...	16	500	8.0	20.0	4.4
23...	18	512	7.7	17.0	.6
23...	20	525	7.6	15.0	.0
23...	22	512	7.6	14.0	.0
23...	24	519	7.6	12.5	.0
23...	26	521	7.6	11.5	.0
23...	28	528	7.6	11.0	.0
23...	30	536	7.6	9.5	.0
23...	32	529	7.6	9.0	.0
23...	34	551	7.5	8.5	.0
23...	36	551	7.4	8.5	.0
23...	38	551	7.4	8.5	.0
23...	40	562	7.4	8.0	.0
23...	42	593	7.0	8.0	.0

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

415913085014300 MORRISON LAKE, DEEP SITE, AT COLDWATER, MI (LAT 41 59 13 LONG 085 01 43)--CONTINUED

DATE	TIME	DEPTH TO BOTTOM OF SAMPLE INTERVAL (FT)	DEPTH OF RESERVOIR (FT)	DEPTH TO TOP OF SAMPLE INTERVAL (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	TRANSPARENCY (SECCHI DISK) (IN)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION
JUN											
23...	1720	8.0	43	8.0	483	8.5	22.5	5	42	7.8	91
23...	1745	35	43	35	551	7.4	8.5	5	--	.0	0

DATE	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UM-MF (COL./ 100 ML)	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)
JUN											
23...	5100	<1	240	96	62	21	14	2.3	180	0	150
23...	--	--	250	88	69	19	16	2.9	200	0	160

DATE	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)
JUN											
23...	.9	63	27	.1	.7	326	280	.17	.01	.18	.20
23...	13	58	38	.1	7.1	365	294	--	--	--	.13

DATE	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO, PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	DISSOLVED IRON (FE) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)
JUN											
23...	.13	.82	.95	1.1	5.0	.03	.01	.00	.00	0	10
23...	2.3	.60	2.9	--	--	.24	.19	.05	.15	80	500

04096514 COLDWATER RIVER AT RIVER ROAD, NEAR HODUNK, MI (LAT 42 00 36 LONG 085 02 27)

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)
JUN									
29...	1245	E48	480	8.0	25.0	7.5	93	.03	.01

DATE	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)
JUN								
29...	.04	.07	.73	.80	.84	3.7	.04	.00

E--ESTIMATED VALUE

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

422055085510800 BRANDYWINE LAKE, SITE 1, NEAR COBLES, MI (LAT 42 20 55 LONG 085 51 08)

DATE	TIME	DEPTH TO BOTTOM OF SAMPLE INTERVAL (FT)	DEPTH OF RESERVOIR (FT)	DEPTH TO TOP OF SAMPLE INTERVAL (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (IN)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UM-MF (COL./100 ML)
JUN 21...	1420	5.0	5.0	.00	71	7.2	24.5	54	8.6	106	3300	85

DATE	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	TOTAL PHYTOPLANKTON (CELLS PER ML)
JUN 21...	.06	.00	.06	.00	1.1	1.1	1.2	5.1	.02	.00	12000

IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 21,77
TIME	1420
TOTAL CELLS/ML	12000
DIVERSITY: DIVISION	0.6
.CLASS	0.6
..ORDER	1.1
...FAMILY	1.1
....GENUS	1.3

ORGANISM	CELLS /ML	PERCENT
CHLOROPHYTA (GREEN ALGAE)		
.CHLOROPHYCEAE		
..CHLOROCOCCALES		
...CHARACIACEAE		
....SCHROEDERIA	*	0
...OOCYSTACEAE		
....DICTYOSPHAERIUM	260	2
..TETRASPORALES		
...PALMELLACEAE		
....SPHAEROCYSTIS	1680	13
CYANOPHYTA (BLUE-GREEN ALGAE)		
.CYANOPHYCEAE		
..CHROCCOCCALES		
...CHROCCOCCACEAE		
....ANACYSTIS	340	3
..HORMOGONALES		
...NOSTOCACEAE		
....ANABAENA	1000	8
..CHROCCOCCALES		
...CHROCCOCCACEAE		
....GOMPHOSPHAERIA	8900#	73

- DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

422103085512500 BRANDYWINE LAKE, SITE 2, NEAR GOBLES, MI (LAT 42 21 03 LONG 085 51 25)

DATE	TIME	DEPTH TO BOTTOM OF SAMPLE INTERVAL (FT)	DEPTH OF RESERVOIR (FT)	DEPTH TO TOP OF SAMPLE INTERVAL (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (IN)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)
JUN											
21...	1500	13	13	.00	74	7.0	22.0	54	6.2	73	4200

DATE	FECAL COLIFORM .7UM-MF (COL./100 ML)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (.4 (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)
JUN											
21...	84	.01	.00	.01	.00	1.0	1.0	1.0	4.5	.03	.00

422053085511400 BRANDYWINE LAKE, SITE 3, NEAR GOBLES, MI (LAT 42 20 53 LONG 085 51 14)

DATE	TIME	DEPTH TO BOTTOM OF SAMPLE INTERVAL (FT)	DEPTH OF RESERVOIR (FT)	DEPTH TO TOP OF SAMPLE INTERVAL (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	TRANSPARENCY (SECCHI DISK) (IN)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION
JUN											
21...	1240	3.0	24	3.0	71	7.2	24.0	100	48	7.1	86
21...	1315	18	24	18	86	6.4	10.0	200	--	.0	--

DATE	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)
JUN										
21...	39	19	11	2.8	2.5	1.3	25	0	21	2.5
21...	36	11	10	2.7	2.3	1.3	31	0	25	20

DATE	DISSOLVED SULFATE (SO4) (MG/L)	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)
JUN										
21...	10	5.2	.0	1.2	47	.02	.01	.03	.01	.00
21...	11	5.2	.0	3.9	56	.02	.00	.02	.01	.22

DATE	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	DISSOLVED IRON (FE) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)
JUN										
21...	1.1	1.1	1.1	5.0	.02	.00	.00	.00	270	10
21...	1.1	1.3	1.3	5.8	.04	.01	.01	.03	3200	680

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

422053085511400 BRANDYWINE LAKE, SITE 3, NEAR GOBLES, MI (LAT 42 20 53 LONG 085 51 14)--CONTINUED

DATE	SAMPLING DEPTH (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)
JUN					
21...	2.0	71	7.2	24.0	7.4
21...	4.0	71	7.2	24.0	6.8
21...	6.0	72	7.2	23.0	6.8
21...	8.0	69	7.1	18.5	5.2
21...	10	74	6.4	15.5	.9
21...	12	77	6.3	14.0	.0
21...	14	81	6.3	12.0	.0
21...	16	85	6.4	10.5	.0
21...	18	86	6.4	10.0	.0
21...	20	93	6.4	10.0	.0
21...	22	98	6.5	9.0	.0
21...	24	103	6.8	9.0	.0

421150085570000 THREE MILE LAKE, SITE 1, NEAR PAW PAW, MI (LAT 42 11 50 LONG 085 57 00)

DATE	TIME	DEPTH TO BOTTOM OF SAMPLE INTERVAL (FT)	DEPTH OF RESERVOIR (FT)	DEPTH TO TOP OF SAMPLE INTERVAL (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (IN)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UM-MF (COL./ 100 ML)
JUN												
20...	1550	10	10	.00	102	8.2	24.0	78	8.8	105	81000	84

DATE	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	TOTAL PHYTOPLANKTON (CELLS PER ML)
JUN											
20...	.01	.00	.01	.05	.67	.72	.73	3.2	.01	.00	55000

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

421150085570000 THREE MILE LAKE, SITE 1, NEAR PAW PAW, MI (LAT 42 11 50 LONG 085 57 00)--CONTINUED

IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 20,77
TIME	1550
TOTAL CELLS/ML	55000
DIVERSITY: DIVISION	0.2
.CLASS	0.2
..ORDER	0.3
...FAMILY	0.3
....GENUS	0.4

ORGANISM	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)		
.CHLOROPHYCEAE		
..CHLOROCOCCALES		
...OOCYSTACEAE		
....ANKISTRODESMUS	*	0
....KIRCHNERIELLA	*	0
....OOCYSTIS	*	0
....TETRAEDRON	*	0
...SCENEDESMACEAE		
....CRUCIGENIA	390	1
....SCENEDESMUS	*	0
..VOLVOCALES		
...VOLVOCACEAE		
....PANDORINA	*	0
CHRYSOPHYTA		
.BACILLARIOPHYCEAE		
..CENTRALES		
...COSCINODISCACEAE		
....CYCLOTELLA	*	0
..PENNALES		
...ACHNANTHACEAE		
....ACHNANTHES	*	0
...NAVICULACEAE		
....NAVICULA	*	0
...NITZSCHIACEAE		
....NITZSCHIA	*	0
.CHRYSOPHYCEAE		
..CHRYSOMONADALES		
...MALLOMONADACEAE		
....MALLOMONAS	*	0
...OCHROMONADACEAE		
....DINOBRYON	*	0
.XANTHOPHYCEAE		
..HETEROCOCCALES		
...CHLOROTHECIACEAE		
....OPHIOCYTIUM	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)		
.CYANOPHYCEAE		
..CHROCOCCALES		
...CHROCOCCACEAE		
....ANACYSTIS	53000#	95
..HORMOGONALES		
...NOSTOCACEAE		
....ANABAENA	560	1
...OSCILLATORIACEAE		
....OSCILLATORIA	*	0
..CHROOCOCCALES		
...CHROCOCCACEAE		
....GOMPHOSPHAERIA	1000	2
EUGLENOPHYTA (EUGLENOIDS)		
.EUGLENOPHYCEAE		
..EUGLENALES		
...EUGLENACEAE		
....TRACHELOMONAS	*	0
PYRRHOPHYTA (FIRE ALGAE)		
.DINOPHYCEAE		
..PERIDINIALES		
...CERATIACEAE		
....CERATIUM	*	0
...PERIDINIACEAE		
....PERIDINIUM	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

421123085570400 THREE MILE LAKE, SITE 2, NEAR PAW PAW, MI (LAT 42 11 23 LONG 085 57 04)

DATE	TIME	DEPTH TO BOTTOM OF SAMPLE INTERVAL (FT)	DEPTH OF RESERVOIR (FT)	DEPTH TO TOP OF SAMPLE INTERVAL (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (IN)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)
JUN											
20...	1800	9.0	9.0	.00	100	8.2	25.0	84	8.1	100	980

DATE	FECAL COLIFORM .7UM-MF (COL./100 ML)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)
JUN											
20...	83	.00	.00	.00	.05	.67	.72	.72	3.2	.01	.00

421145085570200 THREE MILE LAKE, SITE 3, NEAR PAW PAW, MI (LAT 42 11 45 LONG 085 57 02)

DATE	TIME	DEPTH TO BOTTOM OF SAMPLE INTERVAL (FT)	DEPTH OF RESERVOIR (FT)	DEPTH TO TOP OF SAMPLE INTERVAL (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	TRANSPARENCY (SECCHI DISK) (IN)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION
JUN											
20...	1625	4.0	32	4.0	102	8.1	24.0	10	96	10.0	122
20...	1715	24	32	24	102	6.6	12.0	10	--	.0	0

DATE	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)
JUN											
20...	46	13	12	4.0	1.4	.9	41	0	34	.5	7.9
20...	51	20	15	3.4	1.5	1.1	38	0	31	15	8.2

DATE	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)
JUN										
20...	4.4	.1	.3	76	51	.00	.00	.00	.00	.06
20...	4.5	.1	.4	73	54	--	--	--	.25	.07

DATE	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	DISSOLVED IRON (FE) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)
JUN										
20...	.64	.70	.70	3.1	.01	.00	.00	.00	30	10
20...	.52	.59	--	--	.01	.00	.00	.00	100	100

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

421145085570200 THREE MILE LAKE, SITE 3, NEAR PAW PAW, MI (LAT 42 11 45 LONG 085 57 02)--CONTINUED

DATE	SAMPLING DEPTH (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)
JUN					
20...	2.0	102	8.2	24.0	--
20...	4.0	102	8.1	24.0	10.0
20...	6.0	102	8.1	24.0	7.9
20...	8.0	102	8.1	24.0	7.9
20...	10	98	7.6	21.0	7.9
20...	12	101	7.4	19.5	7.5
20...	14	97	7.2	19.0	6.7
20...	16	99	7.0	18.0	4.8
20...	18	95	6.7	17.0	1.6
20...	20	100	6.6	15.0	.2
20...	22	102	6.6	14.0	.1
20...	24	102	6.6	12.0	.0
20...	26	103	6.6	11.5	.0
20...	28	111	6.6	11.0	.0

422219085535000 MILL LAKE, SITE 1, NEAR GOBLES, MI (LAT 42 22 19 LONG 085 53 50)

DATE	TIME	DEPTH TO BOTTOM OF SAMPLE INTERVAL (FT)	DEPTH OF RESERVOIR (FT)	DEPTH TO TOP OF SAMPLE INTERVAL (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (IN)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)	FECAL COLIFORM .7UH-MF (COL./ 100 ML)
JUN												
22...	1345	10	10	.00	154	8.3	23.5	102	7.2	86	B1500	B7

DATE	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	TOTAL PHYTOPLANKTON (CELLS PER ML)
JUN											
22...	.00	.00	.00	.03	.37	.40	.40	1.8	.01	.00	9900

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 to SEPTEMBER 1977

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

422219085535000 MILL LAKE, SITE 1, NEAR GOBLES, MI (42 22 19 LONG 085 53 50)--CONTINUED

IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 22,77
TIME	1345
TOTAL CELLS/ML	9900
DIVERSITY: DIVISION	0.5
.CLASS	0.5
..ORDER	0.7
...FAMILY	0.7
....GENUS	1.5

ORGANISM	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)		
.CHLOROPHYCEAE		
..CHLOROCOCCALES		
...BOTRYOCOCCACEAE		
....BOTRYOCOCCUS	450	5
...OOCYSTACEAE		
....DIMORPHOCOCCUS	96	1
....OOCYSTIS	80	1
...SCENEDESMACEAE		
....SCENEDESMUS	*	0
..TETRASPORALES		
...COCCOMYXACEAE		
....ELAKATOTHRIX	*	0
..ZYGNEMATALES		
...DESMIDIACEAE		
....STAURASTRUM	*	0
CHRYSOPHYTA		
.BACILLARIOPHYCEAE		
..PENNALES		
...NITZSCHIACEAE		
....NITZSCHIA	*	0
.CHRYSOPHYCEAE		
..CHRYSOMONADALES		
...OCHROMONADACEAE		
....DINOBRYON	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)		
.CYANOPHYCEAE		
..CHROCCOCCALES		
...CHROCCOCCACEAE		
....ANACYSTIS	6300#	64
..HORMOGONALES		
...OSCILLATORIACEAE		
....OSCILLATORIA	220	2
..CHROCCOCCALES		
...CHROCCOCCACEAE		
....GOMPHOSPHAERIA	2600#	26
EUGLENOPHYTA (EUGLENOIDS)		
.CRYPTOPHYCEAE		
..CRYPTOMONIDALES		
...CRYPTOCHRYSIDACEAE		
....CHROOMONAS	56	1
PYRRHOPHYTA (FIRE ALGAE)		
.DINOPHYCEAE		
..GYMNODINIALES		
...GYMNODINIACEAE		
....GYMNODINIUM	*	0

- DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

422243085541300 MILL LAKE, SITE 2, NEAR GOBLES, MI (LAT 42 22 43 LONG 085 54 13)

DATE	TIME	DEPTH TO BOTTOM OF SAMPLE INTERVAL (FT)	DEPTH OF RESERVOIR (FT)	DEPTH TO TOP OF SAMPLE INTERVAL (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	TRANSPARENCY (SECCHI DISK) (IN)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION	IMMEDIATE COLIFORM (COL. PER 100 ML)
JUN											
22...	1400	12	12	.00	154	8.3	23.5	120	7.8	93	2000

DATE	FECAL COLIFORM .7UM-MF (COL./ 100 ML)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)
JUN											
22...	81	.00	.00	.00	.06	.39	.45	.45	2.0	.01	.00

422236085540600 MILL LAKE, SITE 3, NEAR GOBLES, MI (LAT 42 22 36 LONG 085 54 06)

DATE	TIME	DEPTH TO BOTTOM OF SAMPLE INTERVAL (FT)	DEPTH OF RESERVOIR (FT)	DEPTH TO TOP OF SAMPLE INTERVAL (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLATINUM-COBALT UNITS)	TRANSPARENCY (SECCHI DISK) (IN)	DISSOLVED OXYGEN (MG/L)	PERCENT SATURATION
JUN											
22...	1200	10	60	10	153	8.7	21.0	10	126	8.2	92
22...	1300	44	60	44	142	7.0	6.5	10	--	3.3	27

DATE	HARDNESS (CA,MG) (MG/L)	NONCARBONATE HARDNESS (MG/L)	DISSOLVED CALCIUM (CA) (MG/L)	DISSOLVED MAGNESIUM (MG) (MG/L)	DISSOLVED SODIUM (NA) (MG/L)	DISSOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO3) (MG/L)	CARBONATE (CO3) (MG/L)	ALKALINITY AS CACO3 (MG/L)	CARBON DIOXIDE (CO2) (MG/L)	DISSOLVED SULFATE (SO4) (MG/L)
JUN											
22...	66	20	17	5.6	5.1	1.3	56	0	46	.2	7.2
22...	67	16	18	5.3	5.1	1.3	62	0	51	9.9	8.3

DATE	DISSOLVED CHLORIDE (CL) (MG/L)	DISSOLVED FLUORIDE (F) (MG/L)	DISSOLVED SILICA (SIO2) (MG/L)	DISSOLVED SOLIDS (RESIDUE AT 180 C) (MG/L)	DISSOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	TOTAL NITRITE PLUS NITRATE (N) (MG/L)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L)	TOTAL AMMONIA NITROGEN (N) (MG/L)
JUN										
22...	11	.0	.2	112	75	.01	.00	.01	.00	.02
22...	11	.0	.8	105	82	.17	.00	.17	.22	.01

DATE	TOTAL ORGANIC NITROGEN (N) (MG/L)	TOTAL KJELDAHL NITROGEN (N) (MG/L)	TOTAL NITROGEN (N) (MG/L)	TOTAL NITROGEN (NO3) (MG/L)	TOTAL PHOSPHORUS (P) (MG/L)	TOTAL ORTHO PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L)	DISSOLVED IRON (FE) (UG/L)	DISSOLVED MANGANESE (MN) (UG/L)
JUN										
22...	.44	.46	.47	2.1	.01	.00	.00	.00	20	10
22...	.42	.43	.60	2.7	.01	.00	.00	.00	110	130

WATER QUALITY DATA, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

STREAMS TRIBUTARY TO LAKE MICHIGAN--CONTINUED

422236085540600 MILL LAKE, SITE 3, NEAR COBLES, MI (LAT 42 22 36 LONG 085 54 06)--CONTINUED

DATE	SAMPLING DEPTH (FT)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)	DISSOLVED OXYGEN (MG/L)
JUN					
22...	2.0	151	8.2	23.0	8.4
22...	4.0	151	8.4	23.0	--
22...	6.0	151	8.4	23.0	--
22...	8.0	151	8.4	23.0	--
22...	10	153	8.7	21.0	8.2
22...	12	150	8.6	20.0	8.0
22...	14	151	8.0	18.0	7.2
22...	16	146	7.6	16.0	7.2
22...	18	150	7.4	13.5	6.0
22...	20	153	7.2	11.0	5.2
22...	22	150	7.1	10.0	5.2
22...	24	147	7.1	9.0	5.0
22...	26	149	7.1	8.5	5.0
22...	28	152	7.1	8.0	5.0
22...	30	152	7.1	8.0	5.0
22...	32	146	7.1	7.5	5.0
22...	34	148	7.1	7.0	5.0
22...	36	148	7.1	7.0	4.8
22...	38	148	7.1	7.0	4.6
22...	40	148	7.0	7.0	4.2
22...	42	140	7.0	7.0	4.0
22...	44	142	7.0	6.5	3.3
22...	46	142	7.0	6.5	2.6
22...	48	142	7.0	6.5	2.3
22...	50	142	7.0	6.5	1.8
22...	52	142	7.0	6.5	1.2
22...	54	142	7.0	6.5	.7
22...	56	150	7.0	6.5	.2
22...	58	150	7.0	6.5	.0
22...	60	158	6.9	6.5	.0

FIGURE 9.--Map showing location of observation wells published in this report.

ALGER COUNTY

461608086373801. Local number, 45N 19W 25BDDB.
LOCATION.--Lat 46°16'08", long 086°37'38", Hydrologic Unit 04060106, 250 ft (76 m) northwest of highway M-44, 0.2 mi (0.3 km) northeast of Kentucky.
Owner: U.S. Forest Service.
AQUIFER.--Glacial deposits of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 66 ft (20 m).
DATUM.--Altitude of land-surface datum is 850 ft (259 m). Measuring point: Top of casing, 3.60 ft (1.10 m) above land-surface datum.
PERIOD OF RECORD.--June 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 6.35 ft (1.94 m) below land-surface datum, June 29, 1960; lowest measured, 14.19 ft (4.33 m) Apr. 3, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 6	12.64	APR 22	11.00	JUN 27	11.78	JUL 20	11.86	AUG 30	12.34	SEP 26	12.11

ALPENA COUNTY

450850083393401. Local number, 32N 6E 23DDA.
LOCATION.--Lat 45°08'50", long 083°39'34", Hydrologic Unit 04070006, on Graham Road, 3 mi (5 km) east and 1.5 mi (2.4 km) north of Long Rapids.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled water table observation well, diameter 6 in (15 cm), depth 88 ft (27 m), screened 79 to 88 ft (24 to 27 m).
DATUM.--Altitude of land-surface datum is 713 ft (217 m). Measuring point: Plywood instrument shelf, 217 ft (0.8 m) above land-surface datum.
REMARKS.--Bottom of hole near top of bedrock.
PERIOD OF RECORD.--November 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 20.98 ft (6.39 m) below land-surface datum, June 1, 1977; lowest, 28.73 ft (8.76 m) Mar. 10, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	--	24.41	25.61	26.82	27.89	28.65	26.22	22.19	21.20	22.60	24.44	25.27
10	--	24.55	25.83	27.00	28.00	28.73	25.78	22.05	21.29	22.74	24.64	25.48
15	--	24.76	25.99	27.15	28.19	28.35	25.03	21.94	21.33	23.06	24.94	25.66
20	--	24.96	26.20	27.34	28.33	27.73	24.12	21.85	21.55	23.44	25.02	25.77
25	--	25.15	26.38	27.48	28.46	27.32	23.11	21.31	21.80	23.87	25.10	25.71
EOM	--	25.39	26.41	27.70	28.53	26.85	22.61	21.18	22.17	24.24	25.11	25.59

WTR YEAR 1977 MAX 20.98 JUN 6, 1977 MIN 28.73 MAR 10, 1977

BARAGA COUNTY

463353088144301. Local number, 48N 32W 12DDCC.
LOCATION.--Lat 46°33'53", long 088°14'43", Hydrologic Unit 04030107, 95 ft (29 m) north of U.S. Highway 41 and 0.5 mi (0.8 km) southeast of Nestoria Road.
Owner: Michigan State Highway Department.
AQUIFER.--Sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in (3.2 cm), depth 10 ft (3 m), screened 7 to 10 ft (2 to 3 m).
DATUM.--Altitude of land-surface datum is 1,630 ft (497 m). Measuring point: Top of casing, 4.78 ft (1.46 m) above land-surface datum.
REMARKS.--Measurements made by Wisconsin-Michigan Power Company.
PERIOD OF RECORD.--September 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.27 ft (1.00 m) below land-surface datum, Apr. 30, 1965; lowest measured, 8.09 ft (2.47 m) Sept. 2, 1960.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 4	6.95	DEC 31	7.00	FEB 28	7.06	APR 29	6.01	JUN 30	6.81	SEP 1	6.62
29	6.87	JAN 28	6.74	APR 1	5.68	JUN 1	6.66	JUL 29	6.78	29	6.22
NOV 30	6.94										

BARRY COUNTY

424540085232O. Local number, 4N 9W 5DAAA.
LOCATION.--Lat 42°45'40", long 085°23'20", Hydrologic Unit 04050007, on Solomon Road 4 mi (6 km) east and 3.5 mi (5.6 km) north of Middleville.
Owner: State Department of Natural Resources.
AQUIFER.--Glacial deposits of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 2 in (5 cm), depth 131 ft (40 m).
DATUM.--Altitude of land-surface datum is 860 ft (262 m). Measuring point: Top of casing, 2 ft (1 m) above land-surface datum.
PERIOD OF RECORD.--December 1964 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 112.7 ft (34.4 m) below land-surface datum, Feb. 17, 1977; lowest measured, 122.0 ft (37.2 m) Mar. 5, 1965.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 9	113.2	FEB 17	112.7	MAY 17	116.1	AUG 16	115.3

BAY COUNTY

435128083582401. Local number, 17N 4E 22DCAA.
LOCATION.--Lat 43°51'28", long 083°58'24", Hydrologic Unit 04080102, at end of Second Street, Pinconning.
Owner: Pinconning Township.
AQUIFER.--Saginaw Formation of Pennsylvania Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 110 ft (33 m), cased to 60 ft (18 m), open end.
DATUM.--Altitude of land-surface datum is 620 ft (189 m). Measuring point: Plywood shelter base, 2.00 ft (0.61 m) above land-surface datum.
REMARKS.--Water levels affected by regional pumping.
PERIOD OF RECORD.--August 1962 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level 0.05 ft (0.02 m) below land-surface datum, Mar. 5, 1976; lowest, 10.53 ft (3.21 m) Aug. 8, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	2.72	2.60	2.26	2.21	2.38	--	2.00	2.50	4.37	4.35	3.72	3.11
10	2.86	--	2.00	2.23	2.33	2.35	2.41	2.86	4.58	3.85	3.31	3.14
15	2.17	2.07	2.02	2.12	2.38	2.29	2.35	--	4.78	3.85	3.73	3.02
20	2.21	2.02	2.00	--	2.50	2.27	2.45	3.70	4.59	4.25	3.73	2.77
25	2.18	2.08	2.11	2.19	2.30	2.35	2.20	5.27	4.94	--	3.28	2.60
EOM	2.19	2.10	2.15	2.26	--	2.25	2.83	4.35	4.35	4.06	3.40	2.37

WTR YEAR 1977 MAX 1.73 APR 5, 1977 MIN 5.70 MAY 24, 1977

BRANCH COUNTY

415602084593701. Local number, 6S 6W 22CABA.
LOCATION.--Lat 41°56'02", long 084°59'37", Hydrologic Unit 04050001, at Bennett and Tibbits Streets, Coldwater.
Owner: City of Coldwater.
AQUIFER.--Sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 113 ft (34 m), screened 73 to 113 ft (22 to 34 m).
DATUM.--Altitude of land-surface datum is 970 ft (296 m). Measuring point: Plywood shelter base, 2.50 ft (0.76 m) above land-surface datum.
REMARKS.--Water levels affected by nearby pumping.
PERIOD OF RECORD.--January 1964 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.0 ft (2.7 m) below land-surface datum, May 6, 1975; lowest, 25.9 ft (7.9 m) May 25, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	24.3	24.7	--	23.1	--	--	22.1	--	20.8	24.1	19.8	--
10	18.7	23.5	23.2	23.5	--	23.4	17.2	--	23.4	24.3	21.4	18.9
15	24.3	23.7	23.3	--	--	--	22.3	--	22.2	19.8	22.9	24.0
20	24.0	20.3	23.4	24.5	--	23.1	22.5	23.7	22.0	17.4	16.8	24.0
25	23.6	19.4	18.5	25.3	--	22.9	22.4	25.9	19.6	23.9	22.1	--
EOM	20.3	23.6	22.3	--	--	22.5	--	23.9	25.5	16.0	23.0	22.8

WTR YEAR 1977 MAX 11.9 APR 9, 1977 MIN 25.9 MAY 25, 1977

CALHOUN COUNTY

422422085071501. Local number, 1S 7W 10BBAB.
LOCATION.--Lat 42°24'22", long 085°07'15", Hydrologic Unit 04050003, at highways M-78 and M-66, 5 mi (8 km) north of Battle Creek.
Owner: Rilla Sabin.
AQUIFER.--Glacial deposits of Pleistocene Age.
WELL CHARACTERISTICS.--Dug water-table well, diameter 15 in (38 cm), depth 12 ft (4 m), open tile bottom.
DATUM.--Land-surface datum is 907.99 ft (276.76 m) above mean sea level. Measuring point: Top of casing, 1.50 ft (0.46 m) above land-surface datum.
REMARKS.--Measured by observer.
PERIOD OF RECORD.--September 1946 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.89 ft (0.27 m) below land-surface datum, Mar. 28, 1950; lowest, dry, July 29, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 6	4.26	DEC 8	4.70	FEB 23	5.10	APR 20	3.84	JUN 15	4.26	AUG 10	4.48
13	4.32	15	4.71	MAR 2	5.14	27	3.85	22	4.28	17	4.54
20	4.41	22	4.77	9	5.10	MAY 4	3.90	29	4.29	24	4.60
27	4.50	JAN 12	4.84	16	4.80	11	3.98	JUL 6	4.32	31	4.63
NOV 3	4.50	19	4.98	23	4.09	18	4.10	13	4.38	SEP 7	4.70
10	4.46	26	5.04	30	3.89	25	4.13	20	4.46	14	4.54
17	4.60	FEB 2	5.00	APR 6	3.89	JUN 1	4.15	27	4.52	21	4.08
24	4.64	9	5.04	13	3.92	8	4.21	AUG 3	4.52	28	4.00
DEC 1	4.62	16	5.08								

CALHOUN COUNTY

422025085084001. Local number, 1S 7W 32DABA.
LOCATION.--Lat 42°20'25", long 085°08'40", Hydrologic Unit 04050003, at Verona well field, Battle Creek.
Owner: City of Battle Creek.
AQUIFER: Marshall Formation of Mississippian Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 8 in (20 cm), depth 127 ft (39 m), cased to 103 ft (31 m).
DATUM.--Land-surface datum is 830.79 ft (253.22 m) above mean sea level. Measuring point: Recorder base, 2.10 ft (0.64 m) above land-surface datum.
REMARKS.--Water levels affected by nearby municipal pumping. Measurements made daily by Water Department.
PERIOD OF RECORD.--October 1939 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.7 ft (0.2 m) below land-surface datum, Apr. 26-27, 1950; lowest, 16.75 ft (5.11 m) July 16, 1959.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	5.60	5.40	5.40	5.30	6.90	6.10	6.10	6.60	6.30	6.70	7.20	7.00
10	5.40	5.10	5.40	5.35	8.25	6.90	5.20	6.40	6.70	9.50	7.40	6.80
15	5.50	5.60	5.50	6.20	7.60	6.30	5.95	5.50	7.20	7.80	7.00	6.80
20	5.30	5.70	5.20	6.65	7.90	6.80	5.80	5.90	6.70	9.80	7.00	7.00
25	5.35	5.35	5.10	5.20	6.45	5.60	6.30	5.90	7.90	8.40	7.00	6.10
EOM	5.50	6.10	5.20	7.50	6.70	5.65	5.25	6.70	7.50	6.90	7.90	7.80

CASS COUNTY

414651085S7..01. Local number, 8S 14W 17BAAA.
LOCATION.--Lat 41°46'51", long 085°57'56", Hydrologic Unit 04050001, 2 mi (3 km) east of Adamsville on U.S. Highway 112.
Owner: Ted Little.
AQUIFER.--Glacial deposits of Pleistocene Age.
WELL CHARACTERISTICS.--Dug water-table well, diameter 28 in (71 cm), depth 55 ft (17 m), cribbed with brick to open bottom.
DATUM.--Altitude of land-surface datum is 840 ft (256 m). Measuring point: Top of wooden platform, 1.00 ft (0.30 m) above land-surface datum.
REMARKS.--Measured by observer.
PERIOD OF RECORD.--September 1945 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 46.20 ft (14.08 m) below land-surface datum, July 16, 1950; lowest, dry, Mar. 10, 1947.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 1	50.10	DEC 22	50.10	FEB 24	50.85	APR 25	51.45	JUN 23	51.30	AUG 24	51.45
23	49.90	JAN 24	50.70	MAR 24	51.40	MAY 23	51.20	JUL 21	51.35	SEP 22	51.70

CHEBOYGAN COUNTY

451304084232901. Local number, 33N 1W 26DABB.
LOCATION.--Lat 45°13'04", long 084°23'29", Hydrologic Unit 04070004, 10 mi (16 km) east of Wolverine on west side of Osmun Road, .25 mi (.40 km) west of Cornwall Lake.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 164 ft (50 m), screened 157 to 164 ft (48 to 50 m).
DATUM.--Altitude of land-surface datum is 933 ft (284 m). Measuring point: Plywood instrument shelf, 3.43 ft (1.05 m) above land-surface datum.
PERIOD OF RECORD.--November 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 56.2 ft (17.1 m) below land-surface datum, May 25, 1971; lowest, 59.9 ft (18.3 m), Dec. 6, 1965.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	57.75	58.03	--	58.53	58.80	58.98	58.99	--	58.95	59.13	59.34	--
10	57.83	58.09	58.38	--	58.80	59.01	58.91	--	59.00	59.19	59.35	--
15	57.92	58.12	58.36	--	58.88	58.97	58.94	58.90	59.01	--	59.42	--
20	57.86	58.16	58.42	58.65	58.87	59.00	58.91	58.90	59.06	59.25	59.41	--
25	57.97	58.17	58.41	58.65	--	58.99	58.88	58.92	59.05	59.30	--	--
EOM	58.03	58.29	58.52	58.73	--	59.05	--	58.92	59.08	59.32	--	58.96

CHIPPEWA COUNTY

462159084442201. Local number, 46N 4W 24DADA.
LOCATION.--Lat 46°21'59", long 084°44'22", Hydrologic Unit 04020203, on trail 0.2 mi (0.3 km) south of highway M-28 and 1 mi (2 km) west of Raco.
Owner: U.S. Forest Service.
AQUIFER.--Glacial deposits of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 54 ft (16 m).
DATUM.--Altitude of land-surface datum is 850 ft (259 m). Measuring point: Top of shelter base, 3.07 ft (0.94 m) above land-surface datum.
PERIOD OF RECORD.--June 1952 to April 1965. November 1969 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 18.40 ft (5.61 m) below land-surface datum, June 7, 1971; lowest, 28.43 ft (8.67 m) Apr. 14, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	22.92	23.61	24.18	24.76	25.25	--	--	22.57	22.04	22.45	22.94	23.42
10	22.98	23.72	24.27	24.82	25.32	--	--	22.40	22.06	22.54	23.00	23.50
15	23.17	23.81	24.33	24.89	25.43	--	--	22.27	22.10	22.60	23.10	23.58
20	23.26	23.90	24.40	24.98	25.50	--	--	22.19	22.21	22.66	23.15	23.65
25	23.40	23.98	24.51	25.06	25.58	--	--	22.13	22.27	22.73	23.25	23.72
EOM	23.53	24.10	24.65	25.17	25.63	--	22.93	22.08	22.35	22.85	23.35	23.76

WTR YEAR 1977 MAX 22.03 JUN 1, 1977 MIN EST. 25.8 MAR 15, 1977

CLINTON COUNTY

425410084323501. Local number, 6N 2W 16DDAD.
LOCATION.--Lat 42°54'10", long 084°32'35", Hydrologic Unit 04050005, at U.S. Highway 27, 6 mi (10 km) south of St. Johns.
Owner: State Highway Department.
AQUIFER.--Gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Driven observation water-table well, diameter 2 in (51 cm), depth 26 ft (8 m), screened 23 to 26 ft (7 to 8 m).
DATUM.--Land-surface datum is 803.32 ft (244.85 m) above mean sea level. Measuring point: Top of casing, 1.30 ft (0.40 m) above land-surface datum.
REMARKS.--Federal key well.
PERIOD OF RECORD.--August 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.84 ft (4.22 m) below land-surface datum, Apr. 30, 1974; lowest measured, 19.93 ft (6.07 m) Feb. 27, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	17.30	DEC 6	17.83	FEB 17	18.44	APR 18	17.77	JUN 16	18.44	AUG 23	18.92
22	17.44	23	17.89	24	18.11	26	17.82	24	18.50	SEP 16	19.00
29	17.54	JAN 5	17.63	MAR 16	18.29	MAY 17	18.13	JUL 18	18.84	26	18.85
NOV 24	17.64	24	18.06	23	18.08	23	18.11	AUG 17	18.92		

CRAWFORD COUNTY

443308084245001. Local number, 25N 1W 15DDCD.
LOCATION.--Lat 44°33'08", long 084°24'50", Hydrologic Unit 04070007, 2.6 mi (4.2 km) south of Eldorado on highway M-18.
Owner: U.S. Forest Service.
AQUIFER.--Glacial deposits of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 56 ft (17 m), cased.
DATUM.--Altitude of land-surface datum is 1,190 ft (363 m). Measuring point: Top of shelter base, 2.95 ft (0.90 m) above land-surface datum.
PERIOD OF RECORD.--November 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 25.71 ft (7.84 m) below land-surface datum, May 10, 1976; lowest, 35.97 ft (10.96 m) Apr. 4-6, 1951.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	27.31	27.77	28.17	28.54	--	29.31	29.51	--	--	29.50	29.71	29.96
10	27.40	27.82	28.18	28.56	--	29.37	--	--	--	29.54	29.75	--
15	27.46	27.90	28.22	28.61	--	29.39	--	--	--	29.56	29.80	--
20	27.57	27.96	28.34	28.70	--	--	--	--	--	29.60	29.82	30.13
25	27.63	28.00	28.38	--	29.21	--	--	--	--	29.65	29.89	30.15
EOM	27.73	28.08	28.45	--	29.24	--	--	--	29.46	29.67	29.92	30.19

WTR YEAR 1977 MAX 27.26 OCT 1, 1976 MIN 30.19 SEP 30, 1977

DELTA COUNTY

454446087090401. Local number, 39N 23W 28ACC.
LOCATION.--Lat 45°44'46", long 087°09'04", Hydrologic Unit 04030111, 3.5 mi (5.6 km) east of Escanaba.
Owner: M. Blake
AQUIFER.--Munising Sandstone of Cambrian Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 5 in (13 cm), depth 530 ft (162 m).
DATUM.--Altitude of land-surface datum is 680 ft (207 m). Measuring point: Top of shelter base, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--July 1968 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 1.5 ft (0.5 m) below land-surface datum, May 6, 1960; lowest, 8.9 ft (2.7 m) Feb. 6, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	--	7.92	8.30	--	8.84	8.49	--	6.33	--	7.03	6.72	6.93
10	--	7.91	8.34	--	--	8.32	--	6.47	6.90	6.72	6.99	6.90
15	--	7.96	8.31	8.64	--	--	6.19	6.58	7.06	6.65	7.07	--
20	7.89	8.01	--	8.68	--	--	6.23	--	6.96	6.80	6.95	--
25	7.90	8.04	--	8.63	--	--	6.21	--	7.07	6.72	7.15	6.04
EOM	7.93	8.16	--	8.73	--	--	6.33	--	7.02	6.80	6.91	6.14

WTR YEAR 1977 MAX 6.00 SEP 25, 1977 MIN 8.87 FEB 6, 1977

DICKINSON COUNTY

460458087493901. Local number, 43N 28W 32ADAB.
LOCATION.--Lat 46°04'58", long 087°49'39", Hydrologic Unit 04030109, 6.25 mi (10.06 km) north of Felch.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene Age.
WELL CHARACTERISTICS.--Augered water-table well, diameter 1¼ in (3.18 cm), depth 31 ft (9 m), screened 29 to 31 ft (8.8 to 9.4 m).
DATUM.--Altitude of land-surface datum is 1,160 ft (353 m). Measuring point: Hole in top of cap, 4.00 ft (1 m) above land-surface datum.
PERIOD OF RECORD.--October 1966 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.10 ft (3.99 m) below land-surface datum, May 17, 1972; lowest measured, 16.50 ft (5.03 m) Mar. 2, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 27	15.82	MAR 2	16.50	MAY 11	14.98	JUL 13	15.69
JAN 11	16.25	APR 21	14.98	JUN 16	15.44	SEP 21	15.61

EATON COUNTY

424435084365001. Local number, 4N 3W 12CDAD.
LOCATION.--Lat 42°44'35", long 084°36'50", Hydrologic Unit 04050004, north of M-43, 0.5 mi (0.8 km) west of Lansing.
Owner: F. Wheeler.
AQUIFER.--Saginaw Formation of Pennsylvanian Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 381 ft (116 m), cased to 140 ft (43 m).
DATUM.--Land-surface datum is 862.91 ft (263.01 m) above mean sea level. Measuring point: Plywood instrument shelf, 1.00 ft (0.30 m) above land-surface datum.
REMARKS.--Water levels affected by pumping.
PERIOD OF RECORD.--October 1953 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 67.5 ft (20.6 m) below land-surface datum, Nov. 23, 1953; lowest, 103.6 ft (31.6 m) Aug. 28, 1969.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	84.9	84.8	86.4	82.6	--	84.4	81.3	80.6	88.6	--	89.1	88.2
10	84.2	86.1	87.0	--	--	84.4	80.1	82.3	86.5	--	88.4	90.6
15	83.4	86.0	86.4	--	84.9	83.8	80.0	84.6	86.0	92.4	87.4	90.7
20	84.0	86.0	86.4	--	85.6	85.8	84.6	89.9	--	91.7	91.7	88.3
25	82.9	86.3	85.7	--	84.8	86.7	83.7	91.2	--	92.6	87.5	85.0
EOM	83.9	84.3	82.1	--	84.5	85.9	80.7	91.6	--	90.4	87.8	85.0

WTR YEAR 1977 MAX 78.9 MAR 11, 1977 MIN 93.3 JUL 24, 1977

GENESEE COUNTY

425552083382801. Local number, 6N 7E 9DCCC.
LOCATION.--Lat 42°55'52", long 083°38'28", Hydrologic Unit 04080204, at Fisher Body Plant, Grand Blanc.
Owner: General Motors Corporation.
AQUIFER.--Saginaw Formation of Pennsylvanian Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 10 in (25 cm), depth 385 ft (117 m), cased to 150 ft (46 m).
DATUM.--Land-surface datum is 837.0 ft (255.1 m) above mean sea level. Measuring point: Base for recorder, 1.50 ft (0.46 m) above land-surface datum.
REMARKS.--Water levels affected by nearby pumping. Measurements made by Plant Water Department.
PERIOD OF RECORD.--January 1974 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 52.3 ft (15.9 m) below land-surface datum, Dec. 29, 1975; lowest, 87.0 ft (26.5 m) Jun. 29, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	66.5	64.5	61.9	64.5	63.7	64.8	69.8	59.6	77.4	71.5	69.8	65.8
10	65.1	71.0	64.0	61.4	61.5	--	63.9	61.6	67.6	68.3	67.4	67.0
15	64.5	72.2	63.7	59.1	61.7	69.8	--	65.8	66.6	71.9	66.8	66.8
20	64.2	62.6	60.8	59.4	62.9	66.9	58.8	79.6	68.1	73.1	67.7	65.1
25	64.5	61.9	62.4	58.1	63.2	70.4	57.7	83.1	73.1	76.6	65.0	62.8
EOM	64.3	60.9	--	61.8	64.3	71.0	58.6	79.1	87.0	72.7	67.0	64.5

WTR YEAR 1977 MAX 56.3 APR 25, 1977 MIN 87.0 JUN 29, 1977

GOGEBIC COUNTY

463046090092401. Local number, 48N 47W 34DAAA01.
LOCATION.--Lat 46°30'46", long 090°09'24", Hydrologic Unit 04010302, 4 mi (6 km) north of Ironwood on Route 505.
Owner: City of Ironwood.
AQUIFER.--Sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 22 ft (7 m).
DATUM.--Altitude of land-surface datum is 1,190 ft (363 m). Measuring point: Top of recorder base, 2.40 ft (0.73 m) above land-surface datum.
REMARKS.--Water levels affected by nearby pumping
PERIOD OF RECORD.--July 1961 to current year. Continuous recorder from 1961 to 1976.
EXTREMES FOR PERIOD OF RECORD.--Highest water level 0.7 ft (0.2 m) above land-surface datum, Apr. 9, 1969; lowest, 8.6 ft (2.6 m) below land-surface datum, March 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 9	6.12	MAY 4	3.68	JUN 15	5.35	JUL 20	5.90	AUG 25	6.10

GRAND TRAVERSE

443921085213S01. Local number, 26N 9W 14ABAA.
LOCATION.--Lat 44°39'21", long 085°21'35", Hydrologic Unit 04060105, 5.5 mi (8.8 km) north of Fife Lake.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 6 in (15 cm), depth 80 ft (24 m), PVC pipe and screen.
DATUM.--Altitude of land-surface datum is 960 ft (293 m). Measuring point: Plywood instrument shelf, 2.85 ft (0.87 m) above land-surface datum.
PERIOD OF RECORD.--June 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 23.32 ft (7.11 m) below land-surface datum, June 17, 1976; lowest, 26.65 ft (8.12 m), Mar. 17, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	24.59	25.05	--	--	--	--	26.11	24.79	24.86	25.17	25.53	25.91
10	24.68	25.12	--	--	26.28	--	25.67	24.75	24.92	25.23	25.59	25.97
15	24.75	25.19	--	--	--	--	25.43	24.73	24.97	25.28	25.66	26.03
20	24.82	25.26	--	--	--	26.64	25.20	24.74	25.02	25.34	25.72	26.09
25	24.90	25.32	--	--	--	26.51	25.01	24.77	25.06	25.40	25.78	26.14
EOM	24.98	25.39	--	--	--	26.35	24.89	24.81	25.10	25.47	25.85	26.20

WTR YEAR 1977 MAX 24.52 OCT 1, 1976 MIN 26.65 MAR 1, 1977

HILLSDALE COUNTY

415236084313701. Local number, 7S 2W 10BDDD.
LOCATION.--Lat 41°52'36", long 084°31'37", Hydrologic Unit 04100003, 2.5 mi (4.0 km) west of Pittsford on M-43.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene Age.
WELL CHARACTERISTICS.--Augered water-table well, diameter 1¼ in (3.2 cm), depth 20 ft (6 m), screened 17 to 20 ft (5 to 6 m).
DATUM.--Altitude of land-surface datum is 1,070 ft (326 m). Measuring point: Top of casing, 4.00 ft (1.22 m) above land-surface datum.
PERIOD OF RECORD.--December 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 7.73 ft (2.36 m) below land-surface datum, May 14, 1969; lowest measured, 11.1 ft (3.38 m), Sept. 21, 1967.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 28	10.00	JAN 17	9.85	MAR 29	8.33	MAY 20	8.47	JUL 21	9.40	SEP 22	9.21
DEC 10	9.34	MAR 1	8.97	APR 22	7.73	JUN 21	8.76	AUG 22	8.91		

INGHAM COUNTY

424502084331301. Local number, 4N 2W 9BDAD.
LOCATION.--Lat 42°45'02", long 084°33'13", Hydrologic Unit 04050004, at North Grand River Avenue and Josephine Streets, Lansing.
Owner: City of Lansing.
AQUIFER.--Saginaw Formation of Pennsylvanian Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 14 in (36 cm), depth 395 ft (120 m), cased to 49 ft (15 m).
DATUM.--Land-surface datum is 828.81 ft (252.62 m) above mean sea level. Measuring point: Plywood shelter base, 9.4 ft (2.9 m) below land-surface datum.
REMARKS.--Water levels affected by regional pumping.
PERIOD OF RECORD.--December 1929 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 15.63 ft (4.76 m) below land-surface datum, Mar. 26, 1931; lowest, 179.4 ft (54.7 m) Apr. 29, 1968.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	--	--	--	82.0	--	82.6	--	84.2	95.5	99.7	100.4	100.2
10	--	--	--	--	--	83.0	--	85.5	93.9	99.5	99.7	100.4
15	--	86.5	--	--	85.0	82.3	82.8	87.0	93.2	101.6	100.0	100.1
20	--	--	--	--	--	--	84.0	91.5	95.2	100.8	99.0	99.0
25	--	--	--	--	--	--	84.4	95.1	97.9	101.3	99.6	98.1
EOM	--	--	--	--	--	--	85.3	96.7	100.6	99.2	101.3	98.7

WTR YEAR 1977 MAX 81.2 MAR 1977 MIN 102.2 JUL 20, 1977

IRON COUNTY

460455088412901. Local number, 43N 35W 33BDAD.
LOCATION.--Lat 46°04'55", long 088°41'29", Hydrologic Unit 04030106, 1.3 mi (2.1 km) south of junction U.S. 2 on highway M-73.
Owner: State Highway Department.
AQUIFER.--Sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Driven water-table well, diameter 1¼ in (3.2 cm), depth 12 ft (4 m), screened 9 to 12 ft (3 to 4 m).
DATUM.--Altitude of land-surface datum is 1,520 ft (463 m). Measuring point: Top of casing, 2.05 ft (0.62 m) above land-surface datum.
REMARKS.--Measured by Wisconsin-Michigan Power Company.
PERIOD OF RECORD.--September 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.66 ft (0.51 m) below land-surface datum, June 1, 1973; lowest measured, 8.44 ft (2.57 m) Mar. 15, 1949.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 1	5.66	JAN 3	6.24	MAR 1	6.65	MAY 2	5.81	JUL 1	6.72	AUG 30	6.94
DEC 1	5.96	31	6.47	31	6.39	31	6.06	AUG 1	6.94	SEP 30	6.16

JACKSON COUNTY

421435084234801. Local number, 3S 1W 2BDBA.
LOCATION.--Lat 42°14'35", long 084°23'48", Hydrologic Unit 04050004, at end of Hamburg Street, Jackson.
Owner: City of Jackson.
AQUIFER.--Saginaw Formation of Pennsylvanian Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 12 in (30 cm), depth 400 ft (122 m), open bottom.
DATUM.--Altitude of land-surface datum is 935 ft (285 m). Measuring point: Plywood recorder shelf, 4.00 ft (1.22 m) above land-surface datum.
REMARKS.--Water levels affected by pumping.
PERIOD OF RECORD.--August 1966 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 16.3 ft (5.0 m) below land-surface datum, Jan. 3, 1971; lowest, 68.8 ft (21.0 m) June 30, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	38.4	37.8	43.4	36.2	39.4	39.0	35.9	36.8	38.3	36.6	48.6	33.9
10	32.6	37.8	33.8	33.4	41.4	39.3	26.6	36.2	39.7	34.6	44.9	43.1
15	36.4	35.5	36.6	37.2	39.4	36.8	39.8	36.6	37.5	42.2	41.0	42.6
20	35.5	36.6	35.4	39.1	36.2	34.2	39.2	42.7	38.4	44.2	41.4	40.3
25	31.9	35.4	30.0	38.4	42.6	38.7	36.6	44.8	41.1	40.2	43.2	34.0
EOM	31.3	36.2	28.6	37.0	38.3	36.3	38.1	44.3	37.8	45.7	39.2	35.1

WTR YEAR 1977 MAX 23.1 APR 10, 1977 MIN 48.6 AUG 5, 1977

KALAMAZOO COUNTY

421641085350601. Local number, 2S 11W 22CDBB.
LOCATION.--Lat 42°16'41", long 085°35'06", Hydrologic Unit 04050003, at southwest corner Crosstown Parkway and Stockbridge Avenue, Kalamazoo.
Owner: City of Kalamazoo.
AQUIFER.--Glacial deposits of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 4 in (10 cm), depth 137 ft (42 m), screened 134 to 137 ft (41 to 42 m).
DATUM.--Land-surface datum is 764.7 ft (233.1 m) above mean sea level. Measuring point: Top of casing, 2.00 ft (0.61 m) above land surface datum,
REMARKS.--Water levels affected by nearby pumping.
PERIOD OF RECORD.--August 1960 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.81 ft (1.47 m) below land-surface datum, Feb. 5, 1975; lowest, 31.08 ft (9.47 m) Aug. 19, 1961.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	11.37	9.69	8.87	e)8.50	8.69	9.13	8.22	10.00	12.45	12.83	14.33	e)13.10
10	11.30	9.57	9.06	7.80	8.50	8.93	8.17	9.93	12.15	--	e)14.30	e)12.80
15	11.30	9.16	8.78	8.72	--	8.70	8.96	10.86	11.56	--	e)14.00	e)12.50
20	10.93	9.17	8.56	8.93	--	8.82	10.35	12.37	11.76	13.80	13.56	12.22
25	10.38	8.97	8.58	8.85	9.46	8.83	10.19	13.42	12.93	13.92	13.18	e)12.40
EOM	10.02	8.40	8.33	8.27	9.04	8.85	9.65	12.78	13.26	14.01	e)13.30	e)12.20

WTR YEAR 1977 MAX 7.15 DEC 27, 1976 MIN 14.35 AUG 6, 1977

KALAMAZOO COUNTY

421325085404801. Local number, 3S 12W 11BDAD.
LOCATION.--Lat 42°13'25", long 085°40'48", Hydrologic Unit 04050003, at Kalamazoo Community College.
Owner: City of Kalamazoo.
AQUIFER.--Glacial deposits of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 3 in (7.6 cm), depth 248 ft (76 m).
DATUM.--Altitude of land-surface is 880 ft (268 m). Measuring point: Top of shelter base, 4.0 ft (1.2 m) above land-surface datum.
PERIOD OF RECORD.--March 1961 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, +2.98 ft (+0.91 m) above land-surface datum, Sept. 4, 1969; lowest, 1.04 ft (0.32 m) below land-surface datum, Aug. 4, 1977.

WATER LEVEL, IN FEET ABOVE AND BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	+1.45	+1.45	+1.42	--	+1.74	+1.15	+1.06	+0.72	+0.64	-0.33	-0.97	-0.15
10	+1.44	+1.51	+1.52	--	+1.65	+1.10	+1.06	+0.66	+0.22	-0.46	-1.04	-0.06
15	+1.43	+1.52	+1.58	+1.94	+1.55	+1.10	+1.05	+0.53	-0.01	-0.55	-0.10	-0.02
20	+1.41	+1.50	+1.55	+1.74	--	+1.10	+1.05	+0.60	-0.15	-0.69	+0.05	+0.02
25	+1.38	+1.51	+1.59	+1.77	+1.18	+1.14	+0.91	+0.46	-0.24	-0.82	+0.04	+0.07
EOM	+1.39	+1.46	+1.57	+1.80	+1.16	+1.09	+0.87	+0.23	-0.22	-0.88	-0.32	+0.07

WTR YEAR 1977 MAX +1.84 JAN 14, 1977 MIN -1.04 AUG 4, 1977

KENT COUNTY

425305085432001. Local number, 6N 12W 27BBBA.
LOCATION.--Lat 42°53'05", long 085°43'20", Hydrologic Unit 04050006, at 44th Street and Byron Avenue, Wyoming.
Owner: City of Wyoming.
AQUIFER.--Marshall Formation of Mississippian Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 14 in (36 cm), depth 265 ft (81 m), cased to 207 ft (63 m).
DATUM.--Land-surface datum is 707.24 ft (215.57 m) above mean sea level. Measuring point: Top of shelter base, 1.50 ft (0.46 m) above land-surface datum.
REMARKS.--Water levels affected by pumping.
PERIOD OF RECORD.--October 1962 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 46.38 ft (14.14 m) below land-surface datum, May 21, 1974; lowest, 56.05 ft (17.08 m) Aug. 8, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	47.25	47.43	--	47.68	48.12	48.09	47.70	47.90	48.37	48.55	48.93	48.92
10	47.37	47.43	47.71	47.78	48.01	47.93	47.64	47.88	48.43	48.73	48.88	49.08
15	47.38	47.38	47.55	--	48.06	47.82	47.72	48.20	48.38	48.98	48.92	49.12
20	47.28	47.54	47.59	--	48.10	47.88	47.74	48.34	48.45	48.85	49.00	--
25	47.32	47.47	47.58	47.80	48.14	47.88	47.70	48.38	48.72	48.78	49.08	49.03
EOM	47.38	--	47.51	47.85	48.05	47.92	47.93	48.40	48.80	48.80	49.01	49.06

WTR YEAR 1977 MAX 47.13 OCT 9, 1976 MIN 49.13 AUG 28, 1977

KENT COUNTY

425030085434901. Local number, 5N 12W 4DCCD.
LOCATION.--Lat 42°50'30", long 085°43'49", Hydrologic Unit 04050006, 2.1 mi (3.4 km) north of Byron Center and 0.4 mi (0.6 km) west of Byron Center Road.
Owner: City of Wyoming.
AQUIFER.--Sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 86 ft (26 m).
DATUM.--Land-surface datum is 685.97 ft (209.08 m) above mean sea level. Measuring point: Top of shelter base, 2.50 ft (0.76 m) above land-surface datum.
PERIOD OF RECORD.--October 1962 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 8.28 ft (2.52 m) below land-surface datum, Apr. 14, 1974; lowest, 12.91 ft (3.93 m) Aug. 19, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	10.86	10.75	--	--	--	--	9.97	10.30	10.88	11.13	11.42	11.36
10	10.75	10.77	10.82	--	10.80	--	10.03	10.43	10.89	11.30	11.29	11.47
15	10.78	10.79	10.80	--	--	10.02	10.23	10.58	10.96	11.47	11.32	11.46
20	10.76	10.80	10.82	--	--	10.05	10.31	10.70	10.98	11.48	11.39	--
25	10.75	10.81	10.83	10.90	--	10.05	10.08	10.81	11.08	11.28	11.41	11.27
EOM	10.74	10.78	--	--		10.04	10.26	10.91	11.20	11.32	11.33	11.33

WTR YEAR 1977 MAX 9.87 APR 4, 1977 MIN 11.50 JUL 21, 1977

LAKE COUNTY

435348085514401. Local number, 17N 13W 4ADAA.
LOCATION.--Lat 43°53'48", long 085°51'44", Hydrologic Unit 04060101, at Aster Road and 8th Street, Baldwin.
Owner: Chesapeake and Ohio Railroad.
AQUIFER.--Glacial deposits of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 8 in (20 cm), depth 83 ft (25 m).
DATUM.--Altitude of land-surface datum is 840 ft (256 m). Measuring point: Top of casing, 11.5 ft (3.5 m) below land-surface datum.
PERIOD OF RECORD.--July 1957 to July 1977.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 15.16 ft (4.62 m) below land-surface datum, July 15, 1969; lowest measured, 20.36 ft (6.21 m) May 23, 1958.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 20	17.03	DEC 27	17.64	APR 20	16.54	JUL 6	17.68

LENAWEE COUNTY

420246084150601. Local number 5S 1E 12DDBD.
LOCATION.--Lat 42°02'46", long 084°15'06", Hydrologic Unit 04100002, 2 mi (3 km) west of Cambridge Junction in the Onsted State Game Area.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in (3.2 cm), depth 39 ft (12 m), screened 36 to 39 ft (11 to 12 m).
DATUM.--Altitude of land-surface datum is 1,000 ft (305 m). Measuring point: Top of casing, 3.00 ft (0.91 m) above land-surface datum.
PERIOD OF RECORD.--December 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 16.33 ft (4.98 m) below land-surface datum, Apr. 26, 1977; lowest measured, 19.33 ft (5.89 m) Sept. 2, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 4	17.88	DEC 3	17.52	MAR 3	17.22	APR 26	16.33	JUN 23	17.72	AUG 24	17.59
NOV 1	17.62	JAN 20	17.93	28	16.73	MAY 25	17.44	JUL 25	17.97	SEP 26	17.67

LIVINGSTON COUNTY

422853083402801. Local number, 1N 6E 13DBAB.
LOCATION.--Lat 42°28'53", long 083°40'28", Hydrologic Unit 04090005, 2 mi (3 km) northwest of South Lyon on Twelve Mile Road.
Owner: American Aggregate Corporation.
AQUIFER.--Glacial deposits of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 2 in (5 cm), depth 29 ft (9 m), 1¼ in (3.2 cm) diameter screen.
DATUM.--Altitude of land-surface datum is 930 ft (283 m). Measuring point: Plywood instrument shelf, 2.50 ft (0.76 m) above land-surface datum.
PERIOD OF RECORD.--April 1970 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 12.1 ft (3.7 m) below land-surface datum, Apr. 22, 1974; lowest, 18.07 ft (5.51 m) Feb. 26, 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	15.50	15.67	16.31	16.73	16.93	17.02	16.06	15.61	16.11	16.75	16.92	17.45
10	15.58	15.85	16.44	16.74	16.96	16.93	15.97	15.91	16.12	16.85	17.10	17.46
15	15.59	15.92	16.57	16.79	16.98	16.95	15.52	16.04	16.18	16.83	17.26	17.38
20	15.58	15.97	16.68	16.85	17.00	16.86	15.56	15.94	16.32	16.86	17.26	17.37
25	15.71	16.18	16.72	16.87	17.02	16.74	15.78	15.96	16.37	17.05	17.35	17.39
EOM	15.74	16.24	16.72	16.90	17.02	16.14	15.58	16.07	16.51	17.08	17.46	17.38

WTR YEAR 1977 MAX 15.26 OCT 1, 1976 MIN 17.52 SEP 6, 1977

MACKINAC COUNTY

460321084354801. Local number, 42N 2W 7AABB.
LOCATION.--Lat 46°03'21", long 084°35'48", Hydrologic Unit 04070002, 2 mi (3 km) north of Pontchartrain Shores at Pontchartrain and St. Ignace Roads.
Owner: U.S. Forest Service.
AQUIFER.--Manistique Dolomite of Silurian Age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 6 in (15 cm), depth 102 ft (31 m).
DATUM.--Altitude of land-surface datum is 650 ft (198 m). Measuring point: Top of shelter floor, 2.3 ft (0.7 m) above land-surface datum.
PERIOD OF RECORD.--June 1956 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 13.1 ft (4.0 m) below land-surface datum, May 11, 1960; lowest, 32.3 ft (9.8 m) Feb. 7, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	29.8	30.6	31.2	31.7	32.1	32.0	17.5	20.1	23.6	26.1	28.0	28.9
10	30.0	30.6	31.3	31.9	32.2	32.0	19.3	20.4	24.2	26.5	28.3	28.9
15	30.1	30.8	31.3	31.9	32.3	25.2	15.8	21.2	24.6	26.8	28.6	28.6
20	30.3	30.8	31.4	31.9	32.3	24.9	17.3	21.9	24.9	27.1	28.7	28.4
25	30.4	30.8	31.4	32.0	32.0	25.2	18.4	22.5	25.3	27.4	28.9	27.6
EOM	30.5	31.0	31.5	32.0	32.0	16.5	19.5	23.1	25.7	27.7	29.1	25.7

WTR YEAR 1977 MAX 15.6 APR 14, 1977 MIN 32.3 FEB 7, 1977

MARQUETTE COUNTY

462938087475901. Local number, 47N 28W 3CCDC.
LOCATION.--Lat 46°29'38", long 087°47'59", Hydrologic Unit 04020105, 4.8 mi (7.7 km) west of Ishpeming on U.S. Highway 41 and M-28.
Owner: Ely Township.
AQUIFER.--Sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 8 in (20 cm), depth 72 ft (22 m), screened 68 to 72 ft (19 to 22 m).
DATUM.--Land-surface datum is 1,571.99 ft (479.14 m) above mean sea level. Measuring point: Top of recorder base, 3.0 ft (0.9 m) above land-surface datum.
REMARKS.--Federal key well.
PERIOD OF RECORD.--August 1961 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.74 ft (2.97 m) below land-surface datum, May 13, 1974; lowest, 19.26 ft (5.87 m) Apr. 10-11, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	15.70	16.35	17.00	17.54	18.09	18.58	17.40	15.56	16.04	16.50	16.82	17.20
10	15.82	16.46	17.11	16.64	18.18	18.65	17.28	15.63	16.11	16.54	16.88	17.19
15	15.95	16.57	17.19	17.74	18.28	18.42	16.74	15.69	16.20	16.57	16.97	17.17
20	16.06	16.65	17.28	17.82	18.36	18.27	16.14	15.76	16.28	16.57	17.03	17.18
25	16.20	16.76	17.37	17.88	18.45	18.26	15.81	15.88	16.36	16.66	17.12	17.12
EOM	16.31	16.89	17.48	18.01	18.50	17.96	15.62	15.95	16.41	16.72	17.20	16.90

WTR YEAR 1977 MAX 15.54 MAY 5, 1977 MIN 18.66 MAR 11, 1977

MENOMINEE COUNTY

453504087331301. Local number, 37N 26W 19DADA.
LOCATION.--Lat 45°35'04", long 087°33'13", Hydrologic Unit 04030108, on Highway U.S. 41 at Carney.
Owner: State Highway Department.
AQUIFER.--Trenton Limestone and Black River Formation of Middle Ordivician Age.
WELL CHARACTERISTICS.--Water-table well, diameter 4 in (10 cm), depth 17 ft (5 m), cased.
DATUM.--Altitude of land-surface datum is 800 ft (244 m). Measuring point: Top of 2 in (5 cm) reducing nipple, 1.26 ft (0.38 m) above land-surface datum.
PERIOD OF RECORD.--September 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.59 ft (1.09 m) below land-surface datum, May 10, 1973; lowest measured, 8.62 ft (2.63 m) Jan. 17, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 13	8.09	JAN 17	8.62	MAY 13	4.97	JUN 23	5.75	AUG 4	5.49	SEP 26	4.48
NOV 24	8.36										

MONROE COUNTY

415235083414001. Local number, 7S 6E 15ADBB.
LOCATION.--Lat 41°52'35", long 083°41'40", Hydrologic Unit 04100002, 1.5 mi (2.4 km) southeast of Petersburg on Teal Road.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in (3.2 cm), depth 17 ft (5 m), screened 14 to 17 ft (4 to 5 m).
DATUM.--Altitude of land-surface datum is 675 ft (206 m). Measuring point: Top of casing, 4.00 ft (1.27 m) above land-surface datum.
PERIOD OF RECORD.--December 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.00 ft (0.91 m) below land-surface datum, Feb. 14, 1966; lowest measured, 6.69 ft (2.04 m), Dec. 29, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 18	4.25	DEC 29	6.69	APR 12	5.46	JUN 20	5.44	AUG 29	5.97
NOV 24	5.24	MAR 8	6.64	MAY 12	4.76	JUL 25	5.70		

MUSKEGON COUNTY

431806086044401. Local number, 11N 15W 34ADDD.
LOCATION.--Lat 43°18'06", long 086°04'44", Hydrologic Unit 04060102, 8 mi (13 km) northeast of Holton on Holton-Duck Lake Road.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in (3.2 cm), depth 31 ft (9 m), screened 28 to 31 ft (8.5 to 9 m).
DATUM.--Altitude of land-surface datum is 595 ft (181 m). Measuring point: Top of casing, 4.00 ft (1.22 m) above land-surface datum.
PERIOD OF RECORD.--November 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.03 ft (0.01 m) above land-surface datum, May 22, 1974; lowest measured, 4.74 ft (1.44 m) below land-surface datum, Sept. 5, 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 21	2.18	JAN 6	1.38	APR 28	1.08	JUL 6	2.47

OAKLAND COUNTY

424133083293201. Local number, 3N 8E 3DBAB.
LOCATION.--Lat 42°41'33", long 083°29'32", Hydrologic Unit 04090005, 3 mi (5 km) east of White Lake at White Lake and Teggerdine Roads.
Owner: Huron Clinton Metropolitan Park Authority.
AQUIFER.--Sand and gravel of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 163 ft (50 m), screened 143 to 163 ft (44 to 50 m).
DATUM.--Altitude of land-surface datum is 1,000 ft (305 m) above mean sea level. Measuring point: Plywood instrument shelf, 3.50 ft (1.07 m) above land-surface datum.
PERIOD OF RECORD.--July 1972 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 7.20 ft (2.19 m) below land-surface datum, May 7, 1976; lowest, 10.98 ft (3.35 m) Sept. 7, 1972.

WATER LEVEL IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	9.63	9.53	9.65	9.78	9.90	9.35	8.94	9.04	9.69	--	--	10.83
10	9.54	9.59	9.68	9.78	9.90	9.21	9.07	9.18	9.70	--	--	10.95
15	9.59	9.62	9.64	9.78	9.85	9.29	9.18	9.30	9.77	--	--	10.80
20	9.54	9.62	9.64	9.85	9.87	9.33	9.24	9.38	9.62	--	--	10.66
25	9.56	9.66	9.65	9.80	9.58	9.30	8.87	9.49	--	10.34	10.73	10.58
EOM	9.54	9.55	9.74	9.90	9.55	9.05	9.00	9.62	--	--	10.78	--

WTR YEAR 1977 MIN 8.80 APR 4, 1977 MAX 10.96 SEP 11, 1977

OGEMAW COUNTY

442514084164702. Local number, 23N 1E 2BAAA.
LOCATION.--Lat 44°25'14", long 084°16'47", Hydrologic Unit 04070007, 8 mi (13 km) east of Rose City on south side of Rose City Road.
Owner: Ogemaw County Road Commission.
AQUIFER.--Sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in (3.8 cm), depth 20 ft (6 m).
DATUM.--Altitude of land-surface datum is 1,265 ft (386 m). Measuring point: Top of casing, 2.30 ft (0.70 m) above land-surface datum.
PERIOD OF RECORD.--November 1968 to October 1971. April 1974 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 7.62 ft (2.32 m) below land-surface datum, Apr. 13, 1970; lowest measured, 13.6 ft (4.1 m) Decmeber 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 5	10.79	DEC 8	11.66	APR 20	11.04	JUN 20	11.52	JUL 20	11.86	SEP 29	12.38

ONTONAGON COUNTY

465002089321601. Local number, 51N 41W 8BDBC.
LOCATION.--Lat 46°50'02", long 089°32'16", Hydrologic Unit 04020101, 325 ft (99 m) south of M-64, 1.5 mi (2.4 km) east of Silver City.
Owner: State Corrections Department.
AQUIFER.--Freda Sandstone of Keweenawan Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 100 ft (30 m), cased to 32 ft (10 m).
DATUM.--Altitude of land-surface datum is 620 ft (189 m). Measuring point: Plywood instrument shelf, 3.50 ft (1.07 m) above land-surface datum.
PERIOD OF RECORD.--October 1958 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.20 ft (2.50 m) below land-surface datum, Apr. 15, 1959; lowest measured, 21.82 ft (6.65 m) Dec. 15, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
DEC 15	21.82	FEB 22	21.32	APR 26	12.56	MAY 24	13.34	JUN 21	12.96

PRESQUE ISLE

451634083441801. Local number, 33N 6E 8BBBB.
LOCATION.--Lat 45°16'34", long 083°44'18", Hydrologic Unit 04070006, south side of Grand Lake Highway, 2 mi (3 km) west and 1 mi (2 km) north of Posen.
Owner: A. Styma.
AQUIFER.--Traverse Group.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 61 ft (19 m).
DATUM.--Altitude of land-surface datum 815 ft (248 m). Measuring point: Top of casing, 0.5 ft (0.2 m) above land-surface datum.
PERIOD OF RECORD.--December 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.42 ft (1.65 m) below land-surface datum, Apr. 3, 1967; lowest measured, 16.83 ft (5.13 m) Mar. 5, 1965.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 27	15.41	DEC 6	16.20	APR 7	7.65	JUL 12	13.48	SEP 27	12.53

ROSCOMMON COUNTY

442722084350701. Local number, 24N 2W 20BABA.
LOCATION.--Lat 44°27'22", long 084°35'07", Hydrologic Unit 04070007, 2 mi (3 km) south of Roscommon and 0.5 mi (0.8 km) east of highway M-18 on highway M-103.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene Age.
WELL CHARACTERISTICS.--Jetted water-table well, diameter 8 in (20 cm), depth 14 ft (4 m), open bottom.
DATUM.--Land-surface datum is 1,145.30 ft (349.09 m) above mean sea level. Measuring point: Top of casing, 2.50 ft (0.76 m) above land-surface datum.
REMARKS.--Federal key well.
PERIOD OF RECORD.--December 1934 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.30 ft (0.70 m) below land-surface datum, Apr. 23, 1971; lowest, 6.23 ft (1.90 m) Dec. 6-11, 1949.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	5.23	5.31	5.45	5.55	5.66	5.66	4.55	4.55	4.97	5.46	5.64	5.66
10	5.24	5.32	5.46	5.57	5.68	5.48	4.42	4.64	5.03	5.51	5.64	5.63
15	5.25	5.35	5.47	5.58	5.70	5.00	4.41	4.70	5.09	5.57	5.69	5.68
20	5.27	5.37	5.49	5.61	5.72	4.72	4.42	4.80	5.18	5.64	5.60	5.67
25	5.29	5.40	5.51	5.62	5.62	4.75	4.44	4.84	5.28	5.70	5.61	5.60
EOM	5.30	5.42	5.53	5.65	5.66	4.70	4.50	4.91	5.37	5.65	5.68	5.48

WTR YEAR 1977 MAX 4.40 APR 13, 1977 MIN 5.73 FEB 22, 1977

SANILAC COUNTY

433439082523601. Local number, 13N 13E 12ADAA.
LOCATION.--Lat 43°34'39", long 082°52'36", Hydrologic Unit 04090001, on Wheatland Road 3 mi (5 km) east and .75 mi (1.21 km) north of Argyle.
Owner: U.S. Geological Survey.
AQUIFER.--Marshall Formation of Mississippian Age.
WELL CHARACTERISTICS.--Drilled artesian observation well, diameter 6 in (15 cm), depth 130 ft (40 m), cased with plastic pipe to 48 ft (15 m), open bottom.
DATUM.--Altitude of land-surface datum is 805 ft (245 m). Measuring point: Plywood instrument shelf, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--October 15, 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 18.08 ft (5.51 m) below land-surface datum, Apr. 5, 1977; lowest 21.78 ft (6.64 m) Aug. 4, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	--	20.59	20.66	20.81	21.01	20.35	18.22	--	19.83	20.73	21.75	21.67
10	--	20.63	20.71	20.83	21.00	19.53	18.25	--	19.83	20.93	21.63	21.81
15	20.58	20.63	20.68	20.86	20.97	18.97	19.24	--	20.01	21.16	21.68	21.89
20	20.57	20.66	20.71	20.90	20.92	19.00	--	19.32	20.15	21.27	21.36	21.58
25	20.62	20.68	20.70	20.88	20.73	18.88	--	19.55	20.35	21.49	21.48	21.44
EOM	20.65	20.61	20.78	20.95	20.61	18.47	--	19.80	20.55	21.69	21.61	21.17

WTR YEAR 1977 MAX 18.08 APR 5, 1977 MIN 21.78 AUG 4, 1977

SCHOOLCRAFT COUNTY

461720085565201. Local number, 45N 13W 16CCCB.
LOCATION.--Lat 46°17'20", long 085°56'52", Hydrologic Unit 04060106, at headquarters building Seney Wildlife refuge.
Owner: U.S. Fish and Wildlife Service.
AQUIFER.--Limestones of Upper Ordovician Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 4 in (10 cm), depth 151 ft (46 m), cased to 65 ft (20 m).
DATUM.--Altitude of land-surface datum is 710 ft (216 m). Measuring point: Top of casing, 3.60 ft (1.10 m) below land-surface datum.
PERIOD OF RECORD.--June 1952 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.64 ft (1.41 m) below land-surface datum, Apr. 13, 1971; lowest, 6.50 ft (1.98 m) Oct. 23, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	6.46	6.26	6.13	5.86	5.79	5.54	5.50	5.64	5.87	5.70	5.92	--
10	6.36	6.19	5.97	5.83	5.74	--	5.64	5.69	5.88	5.80	5.98	--
15	6.31	6.19	5.92	5.81	5.71	--	5.50	5.72	5.92	5.79	5.93	--
20	6.32	6.20	5.92	5.81	5.69	5.38	5.61	5.71	5.87	5.84	5.96	--
25	6.31	6.17	5.87	5.75	5.63	5.53	5.59	5.79	5.90	5.92	5.97	5.65
EOM	6.30	6.13	5.87	5.79	5.64	5.37	5.65	5.83	5.71	5.89	5.90	5.70

WTR YEAR 1977 MAX 5.20 DEC 25, 1977 MIN 6.48 OCT 3, 1976

VAN BUREN COUNTY

421435085591001. Local number, 3S 14W 6BAAD.
LOCATION.--Lat 42°14'35", long 085°59'10", Hydrologic Unit 04050001, 5 mi (8 km) northwest of Paw Paw at the southwest corner of 45th and 48th Streets.
Owner: Rex Martin.
AQUIFER.--Sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 1½ in (3.8 cm), depth 59 ft (18 m), screened 56 to 59 ft (17 to 18 m).
DATUM.--Altitude of land-surface datum is 740 ft (226 m). Measuring point: Top of casing, 0.5 ft (.2 m) above land-surface datum.
PERIOD OF RECORD.--May 1963 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 37.22 ft (11.34 m) below land-surface datum, May 30, 1974; lowest measured, 43.28 ft (13.19 m) Nov. 20, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	38.63	DEC 2	38.84	FEB 25	40.10	APR 21	38.32	JUN 20	39.25	AUG 19	38.97
27	38.73	JAN 12	39.67	MAR 21	39.47	MAY 19	39.18	JUL 19	39.23	SEP 21	39.58

WASHTENAW COUNTY

421228083331601. Local number, 3S 7E 24CACA.
LOCATION.--Lat 42°12'28", long 083°33'16", Hydrologic Unit 04090005, at Ypsilanti Township waterworks on Bridge Street.
Owner: Ypsilanti Township.
AQUIFER: Sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 4 in (10 cm), depth 80 ft (24 m), screened 77 to 80 ft (23 to 24 m).
DATUM.--Land-surface datum is 665.56 ft (202.86 m) above mean sea level. Measuring point: Top of coupling, 3.00 ft (0.91 m) above land-surface datum.
REMARKS.--Water level affected by nearby pumping.
PERIOD OF RECORD.--July 1943 to June 1945, December 1949 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 5.79 ft (1.76 m) below land-surface datum, Jan. 5, 1950; lowest, 22.66 ft (6.91 m) Feb. 13, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	14.91	--	15.13	14.99	15.06	14.27	13.65	12.54	13.20	14.24	14.66	14.40
10	14.30	--	14.88	--	14.89	14.05	13.77	12.72	13.30	14.46	14.58	14.29
15	14.37	13.12	15.31	--	15.00	13.93	14.05	12.86	13.36	14.48	14.39	14.07
20	--	14.40	15.49	15.02	14.94	14.02	13.40	13.10	13.64	14.56	14.48	13.89
25	--	15.07	15.25	14.91	--	14.17	12.76	13.26	13.86	14.56	14.48	13.74
EOM	--	15.00	15.04	15.10	--	13.85	12.72	13.27	14.18	14.55	14.45	13.74

WTR YEAR 1977 MAX 12.50 MAY 5, 1977 MIN 15.68 DEC 18, 1976

WEXFORD COUNTY

441503084242201. Local number, 21N 9W 4ABBC.
LOCATION.--Lat 44°15'03", long 084°24'22", Hydrologic Unit 04060102, at Pine and Lake Streets, Cadillac.
Owner: City of Cadillac.
AQUIFER.--Glacial deposits of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), reported depth 277 ft (84 m).
DATUM.--Land-surface datum is 1,291.10 ft (393.53 m) above mean sea level. Measuring point: Top of shelter base, 4.13 ft (1.26 m) above land-surface datum.
REMARKS.--Water level affected by nearby pumping.
PERIOD OF RECORD.--March 1949 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 19.66 ft (5.99 m) below land-surface datum, Oct. 20, 1976; lowest, 27.59 ft (8.41 m) June 30, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 20	19.66	APR 20	20.53	JUL 6	21.79

VAN BUREN COUNTY

421435085591001. Local number, 3S 14W 6BAAD.
LOCATION.--Lat 42°14'35", long 085°59'10", Hydrologic Unit 04050001, 5 mi (8 km) northwest of Paw Paw at the southwest corner of 45th and 48th Streets.
Owner: Rex Martin.
AQUIFER.--Sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 1½ in (3.8 cm), depth 59 ft (18 m), screened 56 to 59 ft (17 to 18 m).
DATUM.--Altitude of land-surface datum is 740 ft (226 m). Measuring point: Top of casing, 0.5 ft (.2 m) above land-surface datum.
PERIOD OF RECORD.--May 1963 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 37.22 ft (11.34 m) below land-surface datum, May 30, 1974; lowest measured, 43.28 ft (13.19 m) Nov. 20, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 7	38.63	DEC 2	38.84	FEB 25	40.10	APR 21	38.32	JUN 20	39.25	AUG 19	38.97
27	38.73	JAN 12	39.67	MAR 21	39.47	MAY 19	39.18	JUL 19	39.23	SEP 21	39.58

WASHTENAW COUNTY

421228083331601. Local number, 3S 7E 24CACA.
LOCATION.--Lat 42°12'28", long 083°33'16", Hydrologic Unit 04090005, at Ypsilanti Township waterworks on Bridge Street.
Owner: Ypsilanti Township.
AQUIFER: Sand of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 4 in (10 cm), depth 80 ft (24 m), screened 77 to 80 ft (23 to 24 m).
DATUM.--Land-surface datum is 665.56 ft (202.86 m) above mean sea level. Measuring point: Top of coupling, 3.00 ft (0.91 m) above land-surface datum.
REMARKS.--Water level affected by nearby pumping.
PERIOD OF RECORD.--July 1943 to June 1945, December 1949 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 5.79 ft (1.76 m) below land-surface datum, Jan. 5, 1950; lowest, 22.66 ft (6.91 m) Feb. 13, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	14.91	--	15.13	14.99	15.06	14.27	13.65	12.54	13.20	14.24	14.66	14.40
10	14.30	--	14.88	--	14.89	14.05	13.77	12.72	13.30	14.46	14.58	14.29
15	14.37	13.12	15.31	--	15.00	13.93	14.05	12.86	13.36	14.48	14.39	14.07
20	--	14.40	15.49	15.02	14.94	14.02	13.40	13.10	13.64	14.56	14.48	13.89
25	--	15.07	15.25	14.91	--	14.17	12.76	13.26	13.86	14.56	14.48	13.74
EOM	--	15.00	15.04	15.10	--	13.85	12.72	13.27	14.18	14.55	14.45	13.74

WTR YEAR 1977 MAX 12.50 MAY 5, 1977 MIN 15.68 DEC 18, 1976

WEXFORD COUNTY

441503084242201. Local number, 21N 9W 4ABBC.
LOCATION.--Lat 44°15'03", long 084°24'22", Hydrologic Unit 04060102, at Pine and Lake Streets, Cadillac.
Owner: City of Cadillac.
AQUIFER.--Glacial deposits of Pleistocene Age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), reported depth 277 ft (84 m).
DATUM.--Land-surface datum is 1,291.10 ft (393.53 m) above mean sea level. Measuring point: Top of shelter base, 4.13 ft (1.26 m) above land-surface datum.
REMARKS.--Water level affected by nearby pumping.
PERIOD OF RECORD.--March 1949 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 19.66 ft (5.99 m) below land-surface datum, Oct. 20, 1976; lowest, 27.59 ft (8.41 m) June 30, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1976 TO SEPTEMBER 1977

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 20	19.66	APR 20	20.53	JUL 6	21.79

TEMPERATURE OF GROUND WATER

Temperatures of ground water are measured as part of a state-wide water resource investigation in cooperation with Michigan Department of Natural Resources. The purpose of these measurements is to determine the natural ground-water temperature of selected points throughout the State. These data, when combined with existing theory, can be used to estimate ground-water temperatures at moderate depth at any point in the State. Measurements of temperature were made by means of "lazy" thermometers (Heath, 19[illegible]), which remain in the well except when being read.

TEMPERATURE (°C) OF GROUND WATER AT INDICATED DEPTH

DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)	DATE	WATER TEMPERATURE (°C)

ALGER COUNTY, 45N19W25BD (LAT 46°16'08", LONG 86°37'38") DEPTH 66 ft (20 m)

DEC. 06, 1976	8.5	JUN. 27 . . .	7.0	AUG. 30 . . .	8.5
APR. 22, 1977	6.5	JUL. 20 . . .	7.5	SEP. 26 . . .	9.0

CLINTON COUNTY, 06N02W16DDAD (LAT 42°54'10", LONG 84°32'35") DEPTH 23 ft (7 m)

OCT. 01, 1976	11.0	FEB. 24 . . .	10.5	JUN. 16 . . .	9.0
OCT. 22 . . .	11.5	MAR. 16 . . .	9.5	JUN. 24 . . .	9.5
NOV. 24 . . .	11.5	MAR. 23 . . .	9.5	JUL. 18 . . .	9.5
DEC. 06 . . .	11.5	APR. 18 . . .	9.0	AUG. 23 . . .	11.0
DEC. 23 . . .	11.5	APR. 26 . . .	9.0	SEP. 16 . . .	11.0
JAN. 05, 1977	10.5	MAY 17 . . .	9.0	SEP. 26 . . .	11.5
FEB. 17 . . .	10.5	MAY 23 . . .	9.0		

DICKINSON COUNTY, 43N28W32AD (LAT 46°04'59", LONG 87°49'37") DEPTH 31 ft (9 m)

OCT. 27, 1976	7.5	APR. 21 . . .	6.5	JUL. 13 . . .	6.0
JAN. 11, 1977	7.5	MAY 11 . . .	7.0	SEP. 21 . . .	7.0
MAR. 02 . . .	7.0	JUN. 16 . . .	6.0		

HILLSDALE COUNTY, 07S02W10BDDD (LAT 41°52'36", LONG 84°31'37") DEPTH 20 ft (6 m)

OCT. 28, 1976	10.5	MAR. 29 . . .	9.0	JUL. 21 . . .	9.0
DEC. 10 . . .	10.0	APR. 22 . . .	8.5	AUG. 22 . . .	9.0
JAN. 17, 1977	9.0	MAY 20 . . .	8.0	SEP. 22 . . .	9.5
MAR. 01 . . .	8.5	JUN. 21 . . .	8.5		

INGHAM COUNTY, 03N01E07DDCA (LAT 42°39'34", LONG 84°21'49") DEPTH 41 ft (12 m)

OCT. 20, 1976	11.0	MAR. 15 . . .	9.5	JUL. 15 . . .	11.0
NOV. 22 . . .	10.5	APR. 15 . . .	9.5	AUG. 12 . . .	11.0
JAN. 04, 1977	10.0	MAY 16 . . .	10.0	SEP. 15 . . .	11.0
FEB. 16 . . .	9.5	JUN. 15 . . .	10.5		

LENAWEE COUNTY, 05S01E12DDBD (LAT 42°02'46", LONG 84°15'06") DEPTH 39 ft (12 m)

OCT. 04, 1976	9.5	MAR. 03 . . .	10.0	JUN. 23 . . .	9.5
NOV. 01 . . .	9.5	MAR. 28 . . .	9.5	JUL. 25 . . .	9.5
DEC. 03 . . .	9.5	APR. 26 . . .	9.5	AUG. 24 . . .	9.5
JAN. 20, 1977	10.0	MAY 25 . . .	9.5	SEP. 26 . . .	9.5

TEMPERATURE (°C) OF GROUND WATER AT INDICATED DEPTH--Continued

DATE	WATER TEMPER-ATURE (°C)	DATE	WATER TEMPER-ATURE (°C)	DATE	WATER TEMPER-ATURE (°C)
MARQUETTE COUNTY, 46N29W02DA (LAT 46°29'59", LONG 87°53'13") DEPTH 19 ft (6 m)					
OCT. 07, 1976	9.5	MAR. 16 . . .	5.0	JUL. 06 . . .	7.5
NOV. 11 . . .	9.0	MAY 09 . . .	5.0	AUG. 04 . . .	9.5
JAN. 21, 1977	7.0	JUN. 07 . . .	6.5	SEP. 06 . . .	10.0
MENOMINEE COUNTY, 37N26W19DA (LAT 45°35'00", LONG 87°33'15") DEPTH 17 ft (5 m)					
OCT. 13, 1976	11.5	MAY 13 . . .	6.0	AUG. 04 . . .	10.0
NOV. 24 . . .	10.0	JUN. 23 . . .	8.0	SEP. 26 . . .	11.5
JAN. 17, 1977	8.0				
MONROE COUNTY, 07S06E15AD (LAT 41°52'35", LONG 83°41'40") DEPTH 17 ft (5 m)					
OCT. 18, 1976	12.0	MAR. 08, 1977	9.0	JUN. 20 . . .	9.0
NOV. 24 . . .	12.0	APR. 12 . . .	8.5	JUL. 25 . . .	10.0
DEC. 29 . . .	11.0	MAY 12 . . .	8.5	AUG. 29 . . .	10.5
OAKLAND COUNTY, 05N08E08ACAC (LAT 42°51'16", LONG 83°32'15") DEPTH 42 ft (13 m)					
OCT. 06, 1976	9.0	MAR. 04 . . .	9.0	JUN. 22 . . .	9.5
NOV. 05 . . .	9.0	MAR. 23 . . .	8.5	JUL. 22 . . .	9.0
DEC. 07 . . .	7.5	APR. 25 . . .	8.5	AUG. 23 . . .	9.0
JAN. 19, 1977	8.0	MAY 24 . . .	9.0	SEP. 23 . . .	10.0
ONTONAGON COUNTY, 46N38W30ADD (LAT 46°21'18", LONG 89°05'43") DEPTH 50 ft (15 m)					
OCT. 07, 1976	7.0	FEB. 10 . . .	7.0	JUN. 14 . . .	7.0
NOV. 10 . . .	7.5	MAY 03 . . .	7.0		
ROSCOMMON COUNTY, 24N02W20BA (LAT 44°27'22", LONG 84°35'07") DEPTH 12 ft (4 m)					
OCT. 22, 1976	9.0	MAR. 18 . . .	5.0	JUL. 20 . . .	8.5
NOV. 22 . . .	8.0	APR. 20 . . .	5.0	AUG. 19 . . .	9.5
DEC. 20 . . .	6.5	MAY 20	6.0	SEP. 20 . . .	10.0
JAN. 20, 1977	6.0	JUN. 20 . . .	7.5		

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October 13, 1977

FACTORS FOR CONVERTING U.S. CUSTOMARY UNITS TO INTERNATIONAL SYSTEM UNITS (SI)

The following factors may be used to convert the U.S. customary units published herein to the International System of Units (SI). Subsequent reports will contain both the U.S. customary and SI unit equivalents in the station manuscript descriptions until such time that all data will be published in SI units.

Multiply U.S. customary units	By	To obtain SI units
	Length	
inches (in)	2.54×10^{1}	millimeters (mm)
	2.54×10^{-2}	meters (m)
feet (ft)	3.048×10^{-1}	meters (m)
miles (mi)	1.609×10^{0}	kilometers (km)
	Area	
acres	4.047×10^{3}	square meters (m^2)
	4.047×10^{-1}	square hectometers (hm^2)
	4.047×10^{-3}	square kilometers (km^2)
square miles (mi^2)	2.590×10^{0}	square kilometers (km^2)
	Volume	
gallons (gal)	3.785×10^{0}	liters (L)
	3.785×10^{0}	cubic decimeters (dm^3)
	3.785×10^{-3}	cubic meters (m^3)
million gallons	3.785×10^{3}	cubic meters (m^3)
	3.785×10^{-3}	cubic hectometers (hm^3)
cubic feet (ft^3)	2.832×10^{1}	cubic decimeters (dm^3)
	2.832×10^{-2}	cubic meters (m^3)
cfs-days	2.447×10^{3}	cubic meters (m^3)
	2.447×10^{-3}	cubic hectometers (hm^3)
acre-feet (acre-ft)	1.233×10^{3}	cubic meters (m^3)
	1.233×10^{-3}	cubic hectometers (hm^3)
	1.233×10^{-6}	cubic kilometers (km^3)
	Flow	
cubic feet per second (ft^3/s)	2.832×10^{1}	liters per second (L/s)
	2.832×10^{1}	cubic decimeters per second (dm^3/s)
	2.832×10^{-2}	cubic meters per second (m^3/s)
gallons per minute (gal/min)	6.309×10^{-2}	liters per second (L/s)
	6.309×10^{-2}	cubic decimeters per second (dm^3/s)
	6.309×10^{-5}	cubic meters per second (m^3/s)
million gallons per day	4.381×10^{1}	cubic decimeters per second (dm^3/s)
	4.381×10^{-2}	cubic meters per second (m^3/s)
	Mass	
tons (short)	9.072×10^{-1}	megagrams (Mg) or metric tons